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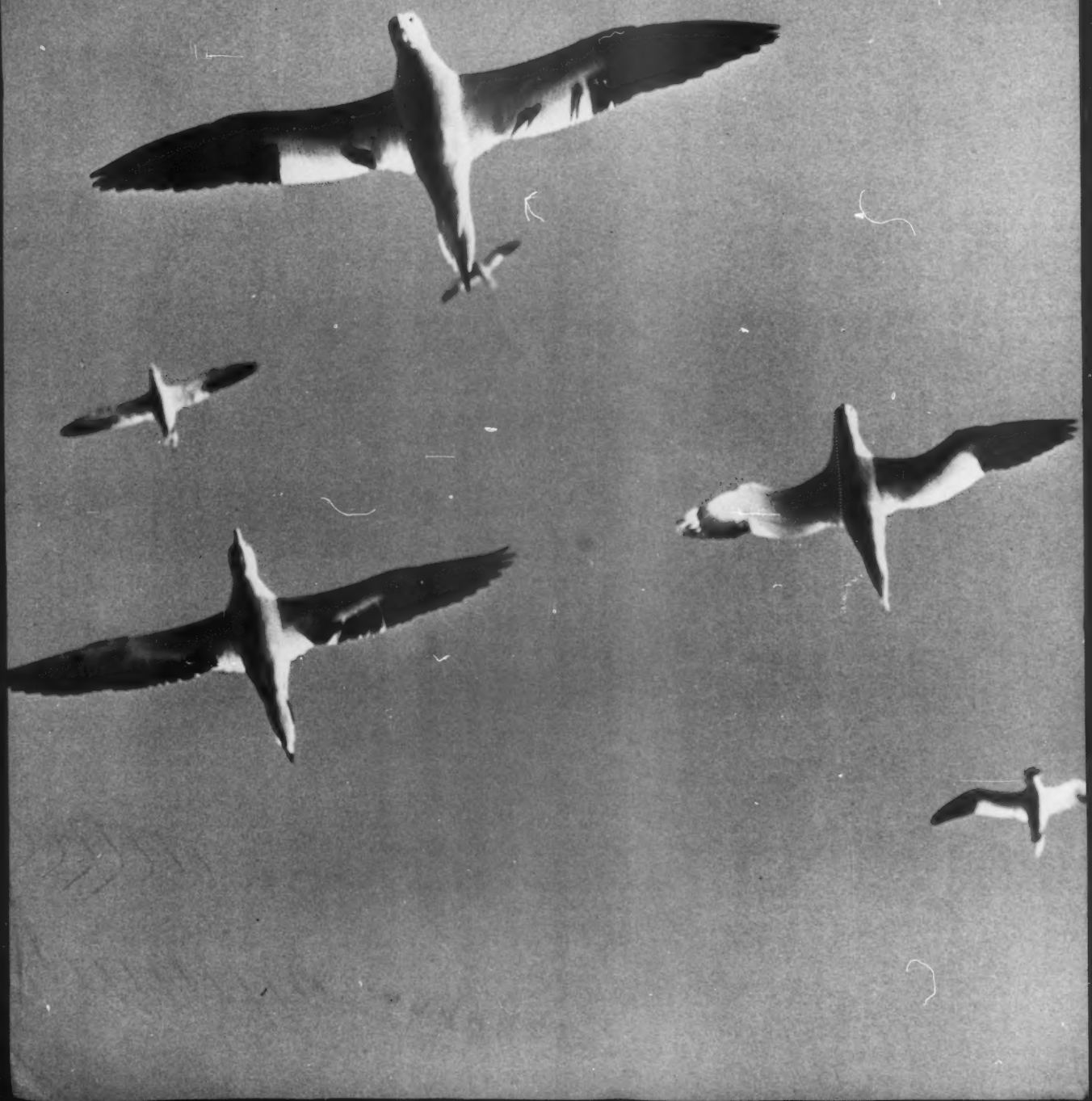
PARKS

AN INTERNATIONAL JOURNAL FOR MANAGERS OF NATIONAL PARKS, HISTORIC SITES, AND OTHER PROTECTED AREAS



PARKS

PUBLISHED BY THE INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES

Volume 8, Number 1 April, May, June 1983

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Cover photo: Fulmars soaring at St. Kilda, the western islands group. These arctic seabirds (Fulmarus glacialis) *nest by the thousands on ledges facing precipitous cliffs which plunge 1200 feet (365 m) and more into the sea. Few ledge-breeding sites are more spectacular than those on Hirta and its smaller sister islands, Boreray, Soay and Dun, all owned by the National Trust for Scotland. A tiny population of people lived at St. Kilda until 1930; they were excellent fowlers, using the fulmars, gannets and other species for food, oil and feathers. Photo: Anne LaBastille*

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John Hoke

Oases of Nature in the Middle of Town

In the middle of Washington, D.C. USA, there is a small park that was created to commemorate Simon Bolivar—a famous public figure during the early development years of South America. In this small park, located directly across from (and maintained by) the US Department of Interior, there is a large masonry reflecting pool. During the first few years after it was built this pool was seldom visited; it collected trash and grew vast amounts of unsightly algae during hot summer months.

Keeping this pond cleaned and repaired was a time-consuming job. To remove trash and algae, the water had to be drained; when the water was removed the ground below would "heave," cracking the pool liner and requiring extensive work. All of this involved considerable expense and personnel time.

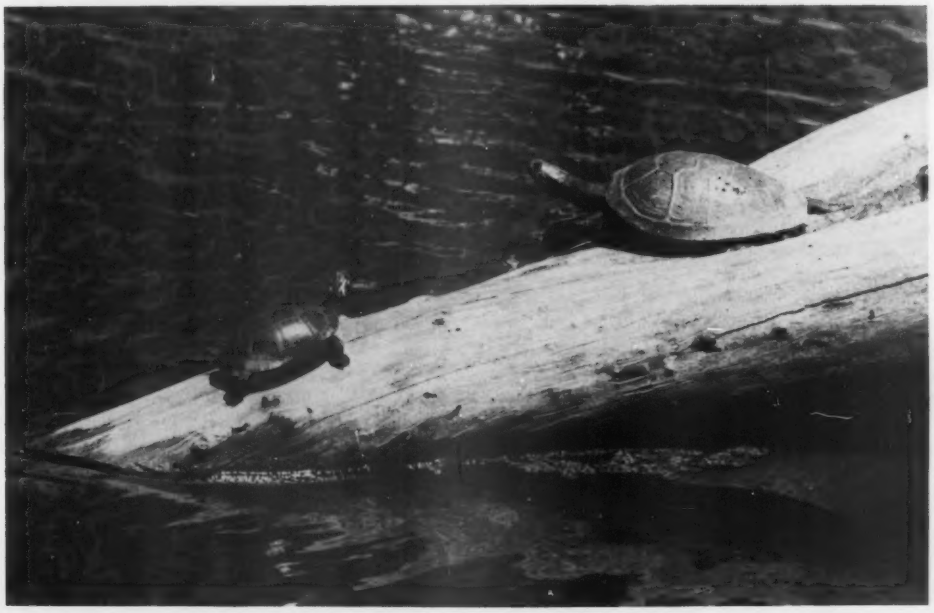
Origins of a Natural Wetland Environment

The late sixties was a time of burgeoning environmental movement in many countries and no less so in the United States. There was a strong desire to make our urban environs cleaner, greener, more natural. In keeping with this trend, several Department of Interior employees felt that these worthy objectives could be demonstrated by putting elements of natural life in the pool in Bolivar Park. When questioned whether it would be fitting to put wetlands wildlife in a park devoted to Simon Bolivar, a Latin American ambassador said nothing could be more appropriate because Simon Bolivar was one of the Western Hemisphere's earliest conservationists, as samples of his writings clearly indicate. Indeed, his words are somewhat haunting because Bolivar spoke eloquently of environmental concerns in his time that are very appropriate now, a century and a half later.

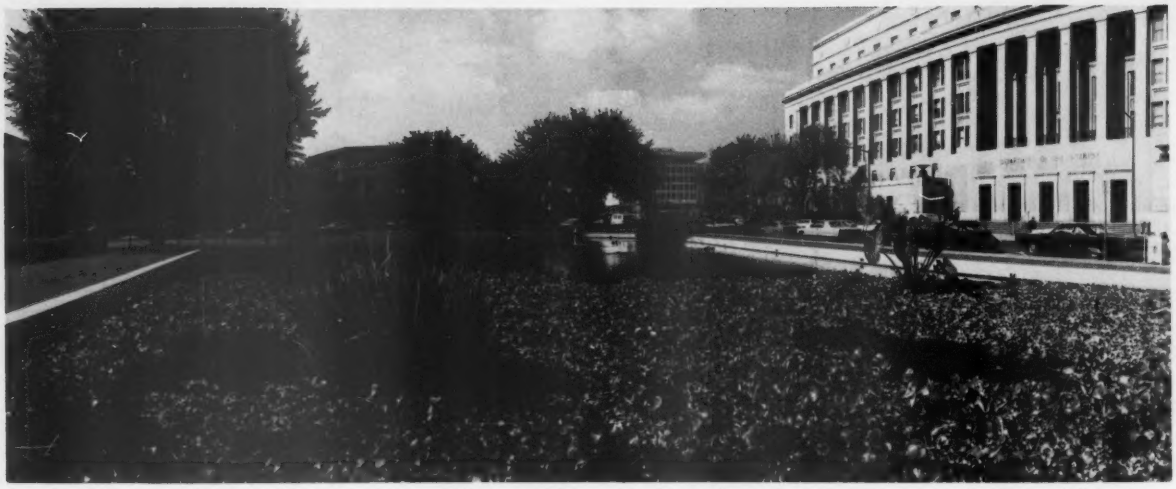
With this implied blessing the naturalizing of Bolivar Pond began. Old logs were placed in the water, along with planting boxes containing stands of cattails, water iris, and other wetlands flora. Floating water lettuce and hyacinth drifted about in ever-changing patterns.

Fish introduced into the pond included bluegills and gambusia—the latter to keep mosquitoes from joining the party. And, lastly, a modest collection of native water turtles was added. These soon became the focal point of the living pond as they basked in the sun in a linear array on the rustic logs.

I was among the few that helped make all this happen and had long thought about such a possibility. During the late 1950s, I traveled about much of Latin America. On one trip to Para-Belem, Brazil (a community located in the mouth of the Amazon river), I stumbled on a small neigh-



Turtles basking on a weathered log in the middle of Bolivar Pond provide constant interest to the many visitors. Several different kinds of native turtles live peacefully together, feeding on algae and discarded food scraps.



Luxuriant aquatic plant life in the middle of a busy city provides a touch of greenery and tranquility for the human visitors, as well as food and shelter for waterfowl, fish and other aquatic wildlife.

borhood botanical garden. While quite modest in size, it featured tanks, ponds and small waterways that had been created to exhibit native fish life of the Amazon Basin.

A similar facility was found during a visit to Georgetown, Guyana. Near town was a small park which featured many water exhibits, including the elusive manatee and native fish life.

During other visits to many cities in South America I became increasingly conscious of the number of ponds and fountains located in the middle of many cities — all too often empty and wasting away because their original novelty had worn off or maintenance costs had become too burdensome. Even that long ago, I thought how they could serve as sites for exhibits of the aquatic life of the surrounding countryside. In many cases people living in urban settings know precious little about the wildlife of their own country. Instead of remaining barren eyesores, these centrally-located ponds could become the focus for such wildlife. On raising the question the answer was always the same: it would be an added cost during times when funds were short. It wasn't until some ten years later, after Bolivar Pond was equipped with a wetlands exhibit, that the best selling point for re-activating these fallow village and city pools became clear.

The Bolivar Pond wetlands became an instant success. Visiting tourists, local residents, and workers from nearby offices quickly chose this poolside site for an outdoor lunch. The pool also attracted visiting wildlife: dragonflies, damselflies, and honey bees. Families of ducks naturally found their way through and over the nearby bustle of traffic; in recent years each spring has brought a flotilla or two of tiny mallard ducklings to grace the new charm of Bolivar Pond.

The one important selling point was quick to surface when we had to defend what we had done. There were some detractors: architectural specialists felt it did injury to many aesthetic design objectives. Others felt an "instant swamp" had not been a part of the original design, and there was the economic question: "Okay, so it's pretty. What did it cost"?

The Question of Costs

This query looked like bad news. After all, it had cost something to make the boxes, to find such things as the old logs and the turtles, and to pay for moving everything into place. So a cost comparison was made.

The results were startling. Even including the initial installation, that year's maintenance costs for the pond were much lower than previously, and they were to become even less with each passing year.

It was the raw numbers of maintenance costs that finally sorted out a major benefit of using such an artificial pond in this way. Mid-season purges of the pond water and subsequent cleaning, to get rid of algae and trash, had in the past cost many thousands of dollars. This process was no longer a frequent necessity. Instead of several purges each year such cleanup would be needed perhaps once in five years.

Once the new system in Bolivar Pond got going, the ever-present algae never again developed to nuisance proportions, becoming but another of the many life forms competing within the balanced ecological system. In time, when the system was left intact year round, its maintenance costs dropped to insignificant levels.

Herein was the beginnings of an economic blessing. While we were not as yet fully aware of just what was happening to make Bolivar Pond self-cleaning, it was obviously happening. At first, we stuck to improving things in Bolivar Pond and answering a growing number of questions from visitors who wanted to know what was happening in the pond—and how they could do similar things in their own home towns. Later we began to expand our experiment.

How to Install a Wetlands Setting in a City Pool

Bolivar Pond is a five-sided masonry affair that includes a plumbed-in water main, drains, and fountain heads (which we ultimately ceased using). The best time to put living things in such a pond is in early spring, when the weather can be expected to remain fair. Basic to the success of the system, and ease of maintenance, is to include assorted water plant and animal life that are compatible and complementary. The choice is fairly easy if one selects life that is native to nearby wetlands environments. With the proper selection, sunlight and a single specially prepared food source provide the only necessary energy input (other than electric power for circulation of water should fountains be desired).

Pond cleaning is done by many dwellers of the aquatic environment and include the little one-cell micro-organisms at the head of the food chain. These animals are not easily seen. Some native aquatic animals such as catfish, frog tadpoles, crayfish and pond-dwelling turtles will help keep water clean by eating animal remains, surplus or discarded bits of food. Such life should not be overfed, nor should unnatural foods be allowed to accumulate in such a man-created wetlands environment. In addition to being unsightly, such excesses over-nourish the water. Enriched water can encourage the growth of algae and in the process deplete the normal oxygen content of the water.

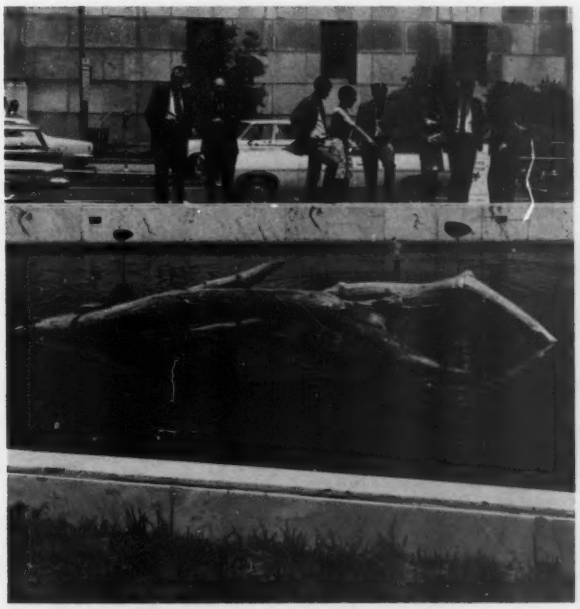
To control needed food input and to insure a healthy diet, commercial trout meal was fed to animal life in the pond. Long used by fish hatcheries, trout meal is packaged in 50-lb bags by several suppliers. Soil and selected plantlife can be obtained from nearby swamplands. Cattails and water iris (or similar plantlife in other countries) are excellent choices, and can be placed at different points in an urban pond to enhance its attractiveness. Swamp plants should be planted in large wooden pots of swamp-bottom soil covered with a thin layer of sand or fine gravel. The pots should be shallow enough to be out of sight below the surface of the water. A typical pot size is 1 × 3 × 3 feet (30 × 91 × 91 cm) made from a suitable water-tolerant wood such as cypress.

A few pots containing only a sand or gravel layer can add interest to such an installation. Certain fish like to breed in such places. If the boxes are located near the edge of the pool, close to the surface, visitors can observe the breeding activity of the fish and their nest-guarding activities.

Ornamental plants such as lilies can be added to provide an effect of floating vegetation. The leaves of many such plants, however, are the choice food of certain turtles, so other floating vegetation should be included to divert some of their grazing from the ornamentals. Ideal choices are duckweed, salvinia, azolla (or local varients of these small floating plants), and water lettuce (lotus of the Nile).

These plants reproduce rapidly enough to provide greens for the turtles to eat, and their movement about the pond provides a constant change of scenery. Sub-surface plants, such as cabomba and other totally-submerged plantlife, are known to enhance greatly the water-cleansing process (such plants thrive on nutrients in the water, and so keep nutrient levels in check), but where water circulation will be involved (for fountainheads, etc.) water intake screens will be needed to avoid clogging water pumps.

In selecting plants, it is best to avoid the use of non-native vegetation, particularly exotic floating plants. In many places, it poses real risks if it accidentally escapes into local water ways. A case in point is water hyacinth. Though it is an attractive ornamental, it has a grim history in many countries. The water hyacinth is an exotic ornamental imported from an eastern country during the 19th century and it became a great liability when it was loosed into ponds and rivers anywhere away from continental frost lines of many countries (and throughout many tropical countries). In very little time, a single hyacinth plant is capable of reproducing itself sufficiently to choke inland waterways. In some places it costs vast amounts of money annually to clear it from navigable rivers and lakes. People visiting an ornamental display such as we are describing can complicate the picture. Because a plant is attractive, visitors may take some to grow in a garden at home, where it might become lodged in a nearby stream and then run rampant in the whole watershed of that part of the country. Description of this process can provide a display exhibit to instruct rather than a stern warning "Do Not Pick."



A natural tree trunk is a resting place for turtles. The branching limbs support the log and offer eye appeal to passersby.

Artistic Additions to the Pond

No wetlands setting seems complete without an old log sticking out of the water. If there are turtles in a pond they will soon find the log, using it as a place to get out of the water and to sun themselves in the early cool of a morning. A naturally-fallen log is the best choice, for it will look more at home than one that is sawed to shape before being installed in the pond. A multi-branched section of a tree, shaped like a hand, with limb "fingers," tends to stand up at the proper angle. If there is room, a very large box of soil can be added, so that the soil domes up out of the water. Planted with wetlands shore vegetation (small shrubs, tree, etc.) this island becomes a sheltered place for turtles to lay their eggs and waterfowl to raise young. This kind of activity insures an ever-changing program of living activity, at almost no added cost for the effort.

Protecting the Urban Transplanted Wetlands Oasis

There always remains the problem of dealing with the few people who may thoughtlessly harm the system or the life in it. There are two ways of offering some added security to the life in such a system. One way is to dye the water so that the bottom cannot be seen; a large percentage of any population is inclined to be timid about entering waters where the bottom cannot be seen clearly. Another is to add obstructions under the water that will offer haven for fish and other water life and discourage people from wading in the water.

This can be handled by immersing large flattened-out bundles of very coarse iron or steel wire screen of the kind that is routinely used to strengthen concrete in highways and road-beds. Mesh sizes of as great as 8 inches (20 cm), and screen widths of 8 to 10 feet (2½ to 3 cm), can be bundled and flattened below the water surface, so it cannot be seen. Turtles and other fish and frog life can easily move through the screen, but attempts to wade or net in the waters will be discouraged by these obstacles.

There are various commercial dyes, such as nigrosene, that are marketed for dying ornamental water bodies. When dye is put in the water it does three important things: it darkens the water more in keeping with the general appearance of normal swamp and wetlands settings (and sets off the water vegetation in an attractive way), it arrests the flow of sunlight into the water and thus discourages algae growth, and it discourages most people from entering the water. The amount of dye needed is very small, just enough to darken the water so you cannot see the bottom of the pool. The result will give the appearance of considerable depth.

Out of the Bolivar Pond experiment was to come further enlightenment. With each passing year we watched the maintenance costs go down and it was logical that at the heart of this was the self-cleaning nature of the system—the interaction of the life in the pond. Whatever was taking place in the living processes at work, an important element was the control of each life form, to the end that no single life form (such as algae) could get enough of an upper hand to run away in the system. Something was always there to feed on such excess growth, and keep things clean and even-going.

Expanding Our Efforts

With the success of Bolivar Pond, other nearby water bodies now attracted our attention. There were two others, also maintained by the National Park Service, that should lend themselves to similar enhancement.

One was the Reflecting Pool, a long shallow pond between the Lincoln Memorial and Washington Monument, and a famous tourist attraction. Frequent fouling with algae meant cleanups and repairs that could cost as much a $20,000, while the accompanying draining of the water left an "eye-sore" for several weeks which did not please the visitors. The other was a 6-acre (2½ ha) Constitution Gardens Lake which suffered the same choking with unsightly strands, mats and domes of filamentous algae.

There was one added restriction to our attempts to naturalize these bodies of water, however — nothing should emerge above the water surface to disturb its reflective purposes. In other words, our workings must remain unseen.

Controlling algae with chemicals had been an earlier option, but we now felt it was ecologically unsound—and set a poor example—for the National Park Service periodically to run its chemically-purged systems down the local drains into nearby waterways . Chemical use was not eliminated but was not to be the primary tool in our management arsenal. Our objective was to introduce more normal biological control mechanisms into the lakes, and in doing so to provide another element of interest and enjoyment for the visitors to the park.

There would always be valid reasons for occasional use of chemicals to control some runaway pest, but we now sought alternatives, and this was a good place to try them.

In the case of Constitution Gardens Lake, the planting boxes for submerged aquatic plants, the judicious use of chemicals and darkening the water with dye did not accomplish our purposes adequately.

While we had installed the rudiments of an ecological system, we felt that micro-organism aquatic life was not yet present in sufficient numbers to do the job that we supposed it capable of doing. To beef up their numbers and variety we pumped in several 1000-gallon tank truck loads of rich swamp-bottom muck from the nearby Kenilworth Aquatic Gardens. This should be sufficiently laden with enough of the many life forms we sought to establish—even in a five million-odd gallon lake.

This seemed to create the crucial mix. The algal blooms became less and less severe with each passing month, to where there has since been no need to purge the lake. From an economic point of view, the battle had been won, and handsomely, and we immediately made plans to use a similar method in the Reflecting Pool.

The Learning Process Goes On

This story really has no end, for we cannot yet draw a map or floor plan of just what has been happening in these three pools. We are now mustering our various disciplines to try to get closer to knowing the whole of what is happening—and has been happening in nature for a long time.

But the systems we installed are working and the cost benefits we have enjoyed suggests that it behooves us to learn as much about these natural processes as possible. The rewards have gone beyond the cost savings. The life these systems have attracted has done much to enliven what in the past have been somewhat sterile park settings. Waterfowl are now a constant fixture at these watery oases in the middle of Washington, D.C. The public enjoys these "intrusions" immensely.

John Hoke is an Urban Park Program Specialist, Division of Resource Management and Visitor Protection, National Capital Region of the US National Park Sevice. Photos courtesy John Hoke.

A similar article appeared in Vol. 19, No. 4, 1982, TRENDS, cooperatively published by the US National Park Service and the National Recreation and Park Association.

Crushed rolls of heavy wire mesh under the water surface discourage human intrusion and provide additional hiding places for fish and small water creatures.

Random DuBois

Tropical Coastal Areas: Production vs Exploitation

As developing countries expand and diversify their economic development, increasing pressure is being put on the exploitation of coastal areas as important sources of protein as well as foreign exchange. In global terms, 90 percent of the total marine fish production is caught from the continental shelf much of which depends upon coastal areas for habitat, feeding and breeding purposes. The Food and Agriculture Organization estimates that coastal fisheries support a full and part-time fisherman population of 9 million, two-thirds of which is concentrated in Asia and the Far East.

Coastal wetlands in tropical countries often are shrouded in mangrove jungles. Decayed leaves from these trees are nursery food for a host of marine species. Great tangles of mangrove roots and branches resist the sea and provide a relatively stable interface between the land and the sea. Photo: Allan Robinson

Approximately 18 percent of the world's total oil production is extracted from nearshore areas which also account for an estimated 68 percent of the world's recoverable hydrocarbons. Significant coastal mining activities include the extraction of gold, diamond, copper, phosphate, chromite, silica sands, aggregate and fluorite. Tourism in many developing coastal countries depends on such attractions as coral reefs, beaches and warm climate.

World demographic statistics indicate that an estimated two-thirds of the world's population and a majority of cities with over one million population are found in the coastal zone.

In the tropics, in addition to abundant natural resources and dense human occupation, coastlines are characterized by several highly productive ecosystems. In stark contract to the nutrient-poor offshore tropical waters, such ecotypes as mangroves, marine grassbeds and coral reefs represent some of the richest and most diverse communities known to man. Whereas the coral reef and mangrove communities are largely restricted to tropical and subtropical latitudes, species of marine grasses extend to temperate and boreal regions.

From an economic perspective, these communities are best known in terms of their importance to fisheries resources. Mangroves have been closely linked to the life cycles of many commercially important species of fin and shellfish and may play a role in the life cycle of 90 percent of all tropical fish species. An estimate for worldwide coral reef fishery potential has been calculated at 3 million tons per year or about 10 percent of the present commercial marine fishery catch.

In addition to the important role these systems play in fisheries production, they also serve other important functions such as coastal buffers from offshore storm surge, coastal stabilizers (mangroves), sediment stabilizers (grassbeds), and breakwater and tourist attractions (coral-reefs).

In developing countries mangroves are exploited for firewood, charcoal, construction material, and agriculture and aquaculture development. African mangrove soils are utilized for sugar, rice and rubber production, with coconuts substituting for these products in the more sandy soils. In Southeast Asia, mangroves are rapidly being cleared for the construction of coastal aquaculture facilities. This activity has also been introduced recently along the Pacific coast of Central and South America. The current rate of mangrove loss is estimated at one million hectares per year.

The state of seagrasses in developing countries is the least known of the three communities. Studies on seagrasses in developed countries have indicated that widespread degradation is associated with thermal effluents, dredge and fill activities, and stream channeling. Seagrasses (as primary producers) require high water quality for light transmission for optimum production and are sensitive to alterations in freshwater and nutrient input patterns.

World Distribution of Mangroves.

Coastlines where

----- *less than five species occur*
—— *with five to twenty species and*
..... *with more than 20 species*

(The areal distribution of mangroves is estimated at 161,729 km² world-wide, while the areal extent of coral reefs in depths of less than 30 meters is roughly estimated at 600,000 km². Reliable estimates of the areal extent of marine grassbeds, however, are not available at present.)

Permission to reproduce from V. IX(2) 1980, p. 81, courtesy of AMBIO, an international environmental journal, published by the Royal Swedish Academy of Sciences.

Coral reefs are also light-demanders and are dependent on high water quality. The presence of coral reefs at the base of many degraded watersheds in developing countries is of particular concern as increased sediment loads and freshwater runoff could prove detrimental to these communities. In addition to indirect pressures, coral reefs continue to suffer from blast fishing in many areas and their direct exploitation for the production of lime and construction materials has been particularly reported in the Indo-Pacific region. Direct exploitation of corals is of grave concern, and estimates for their recovery range from 30 to 100 years.

Until recently, coastal area management initiatives have been confined to the developed countries. Two basic approaches have evolved: an effort to address coastal issues in a comprehensive manner through the passage of new legislation, and the utilization of existing legislation in a more liberal context. In many of the former British colonies, existing Town and Country Planning Acts offer a particularly useful management mechanism. These acts allow local planning authorities to approve proposed development activities that fall within guidelines previously established in an agreed development plan.

For the most part, coastal management in developing countries remains sector specific. Administrative units charged with management often find their responsibilities overlapping or non-existent. For example, despite the known relationship between mangroves and fisheries, their management is often handled by separate agencies. Decisions to exploit one resource are often made at the expense of the other. In response to this and other similar coastal management conflicts, many countries form ad hoc inter-agency committees on an issue-by-issue basis.

In some countries, however, the ad hoc administrative response to coastal issues has evolved one step further. Typical examples are the Philippines and Thailand. In the Philippines an executive order in 1977 requested the National Environmental Protection Council to organize and coordinate an interagency task force to conduct research on the country's coastal areas. This resulted in the creation of the Coastal Zone Management (CZM) Task Force, composed of 22 agencies whose charge was to coordinate all activity in CZM and enforce policies and guidelines to ensure the effective management of the coastal area. In Thailand, in recognition of the need to manage large expanses of underdeveloped coastal areas, an Office of Coastal Land Development was created in 1977 with the responsibility of seeking full utilization of the country's coastline. The Committee, composed of seven specialized government departments, is pursuing this goal through a three-phase effort including survey, planning and implementation components.

National, regional, and local comprehensive responses to coastal issues such as the two cited above should be encouraged and supported in coastal countries. The importance of managed coastal development has never been greater as the pressure to exploit coastal resources in developing countries grows and diversifies. Planned development, management, and conservation reduces the potential for resource use conflicts, provides a means for conflict resolution, and facilitates the incorporation of coastal development into the framework of national development plans.

Random DuBois is a marine ecologist who has lived in Latin America and the Caribbean. His area of expertise is in tropical coastal marine ecosystems and processes, and coastal area management.

This article was reprinted from Natural Resource Technical Bulletin, U.S. National Park Service, No. 3/1982

Interpretive signs in Waitangi National Trust, New Zealand, describe the importance of preserving the mangrove community. Located along a board walk leading deep into a mangrove stand, the displays outline the plants' growth cycle and some of the birds and animals that rely upon the mangrove for survival.

Photo courtesy Waitangi National Trust

Mangrove Destruction

Carrol B. Fleming

In earlier times, mangroves were considered useful in very basic ways. The wood was used for making fish traps, ropes and halters for cattle, and charcoal. Mangrove bark is rich in tannin, which was once extracted for commercial use also.

Increasing population pressures in tropical areas have resulted in the decimation of countless numbers of mangrove areas. Not only have thriving mangrove lagoons been bulldozed and filled, but remaining stands near population centers have suffered slower deaths through pollution, which can result in a fatal algal bloom.

The conditions that threaten mangroves with algal growth are often subtle. Sometimes it's as simple as the development of the waterfront bordering on a mangrove lagoon. When the land is cleared and developed or paved, the increased rainwater runoff washes more nutrients and sediment into the lagoon. The extra nutrients — sewage pollution can do the same thing — result in increased algal growth that can clog the magroves' breathing pores. Or it can block off the sunlight, causing a slower change in the biotic balance. Sediment can also build up from runoff and eventually form a blanket of black mud that kills the trees in much the same way an oil spill does.

Fortunately, public awareness of these problems and of the mangroves' ecological importance is growing. Many places now require some type of official sanction for the cutting of even one mangrove tree. The State of Florida, USA, recently denied a powerful land developer a permit to fill a mangrove area; 10 years earlier the same developer destroyed acres of mangrove trees to build a hotel and no one thought anything about it.

A court case in Puerto Rico awarded the Environmental Quality Board $6.1 million following an oil spill that destroyed 23 acres of mangroves. This compensation worked out to about six cents per organism killed, and it was the first time that a ship's owners have been held responsible for more than the oil cleanup. The penalty may encourage shippers to be more careful in the future, but it can't replace the complex life chain of a formerly thriving lagoon. Puerto Rico, in fact, was one of the first places to institute severe fines for destruction of mangroves.

It is almost certain that only continued public support and appreciation for these quiet areas where such a dense array of life clusters to spawn and grow can save the mangroves and their dependent fisheries.

The mangrove begins life as an elongate seed that drops from its parent plant when ready to root or float. It can tolerate months in salt water riding the currents and still sprout on some distant coast. How ironic that a tree with such a survival capacity is unable to cope with the modern stress of pollution.

California-based science writer Carrol B. Fleming is a frequent contributor to Américas, *as well as to* Science 82 *and* Smithsonian *magazine. She is currently working on a book about Caribbean shorelines.*

Excerpted from Américas, *bimonthly magazine published by the General Secretariat of the Organization of American States, Volume 35, No. 2, March-April, 1983.*

Bibliography on Mangrove Research 1600-1975, compiled by B. Rollet, lists nearly 6,000 references and includes subject and author index. The bibliography provides information for making appropriate decisions on local management of coastal marine resources. The 479-page UNESCO publication is available for $67 from UNPUB, 1180 6th Ave., New York, NY 10036. (From International Water Report, NY, NY)

Anne LaBastille

The National Trust for Scotland

No national parks exist in Scotland — unlike in England and Wales. However, a system of natural and historical properties that is diverse, beautiful, and fascinating is scattered throughout this small, rugged country. These properties are owned and maintained by the National Trust for Scotland, a voluntary non-governmental conservation organization which was established in 1931. Parliament in the National Trust for Scotland Confirmation Act (1935) said, "The National Trust for Scotland shall be established for the purpose of promoting the permanent preservation for the benefit of the nation of lands and buildings in Scotland of historic or national interest or natural beauty.

I was priviledged to visit 12 of the Trust's 90-plus properties during the summer of 1982, as a guest of the National Trust for Scotland and the Scottish Heritage USA, Inc. The latter is a non-profit group that reinforces contact between Scots and North Americans. I was deeply impressed by the wildness and remoteness of many holdings, and by the superb care taken of historical and natural sites. Moreover, I developed a special appreciation for this most unusual private system of resource preservation and public provision which relies on voluntary groups and gifts to achieve care of the Scottish environment.

The National Trust for Scotland was created when no other agency or government body existed which could accept or acquire lands/buildings and hold them for the good of Scottish society. Prior to this, and until modern political events and conservation movements evolved, virtually all land in Scotland was under private ownership. Today NTS owns 90,000 acres (36,423 ha), or roughly 5 percent of the country.

Physically, Scotland is a well-mixed blend of mountains, lochs, islands, a deeply indented shoreline with a lengthy coast of some 2,300 miles (3,700 km). Its population is approximately 5 million (as compared with 55 million in England). The country has been inhabited for more than 5,000 years. During this human occupation, logging, burning, charcoal-making, tanning with oak bark, iron smelting, agricultural clearing, and grazing have significantly altered much of the Scottish landscape. The introduction of sheep in 1740 was a land-use particularly abusive to soils and forests. Whereas once Scotland was 90 percent forested, it now has only 11 percent of its cover in trees. Thus, NTS has had to work with a countryside that is no longer pristine or a wilderness, and which is vastly altered from its original natural condition. The Trust has had to choose carefully the choicest tracts and buildings in order to preserve the "best of what had gone before."

The success story of the Trust is almost unparalled. Its budget today is about $8 million with about 15 percent in grants from government agencies and local authorities. Its membership is over 100,000. The Queen Mother is Patron of the Trust and the country's most influential people often lend useful and wise political and financial support and connections to NTS operations. It also has strong support from alpine clubs, school children, climbing groups, and nature lovers throughout the land.

Another benefit of the Trust is that it is independent, non-political, and sensitive. Thus, it can move swiftly when prime properties become available, and maneouver adroitly in its educational, legal, and environmental programs.

The 12 properties I visited were divided among islands, highlands, castles, and smaller properties.

The Island Properties

By far the most remote land owned by the Trust is *St. Kilda.* It lies 41 miles west of the Outer Hebrides. This forbidding, craggy archipelago includes Hirta (the only habitable island), Soay, Dun, Boreray, plus three small "stacs," the smallest being a 1-acre pile of rock standing 185 feet (56 m) out of the sea. Hirta has the highest cliffs in Great Britain and is thickly populated with nesting seabirds. Boreray is home for 120,000 gannets *(Sula bassana),* more than half of the world's total.

St. Kilda has been inhabited by a variety of people since 2,000 B.C. The most recent islanders were expert fowlers, and used fulmars, gannets and other species for food, eggs, cooking and lighting oil, and feathers. Birds were their form of money (barter). Yet, in time, St. Kildans fell far behind the modern world. Soils failed and disease was rampant. In 1930, the last 36 persons were evacuated to the mainland at their request. The uninhabited archipelago was bequeathed to NTS in 1957.

Each summer, the Trust sends volunteer parties to St. Kilda to work on restoration of the 120-year-old village and other ruins. These trips are greatly coveted by members. A small British Army garrison maintains a missile tracking station on Hirta, as well as a small clinic, generator, and other amenities. By agreement, the Nature Conservancy Council leases the islands from NTS. It puts a warden out there during nesting season to protect the seabirds, rare plant endemics, Soay sheep, and help the occasional visitor. These various groups maintain a splendid cooperation and comradery, relying on each other for survival and companionship. Passing fishermen, who often anchor off Hirta, also mesh with the existing community by bringing mail and supplies at times, and helping in emergencies.

St. Kilda has no scheduled transportation. Persons wishing to visit must make arrangements through NTS to accompany a work party or nature cruise; or charter a private yacht. Weather is most unpredictable, given to vicious storms and high seas. Visitors may be stranded on the islands or unable to disembark for days.

Canna, most westerly of the Inner Hebrides, is fascinating for its mix of natural history, scenery, cultural and agricultural attributes. Flowers and crops thrive on Canna, and adjacent Sanday isle, due to their position near the Gulf Stream. Dr. John L. Campbell, original owner, transferred the islands, buildings, and his superb library of Scottish and Celtic texts to the Trust in 1981. He and his wife will live there, however, until they die. Gaellic scholars are welcome to study upon receiving permission from NTS. Canna and Sanday are classified as sites of special scientific interest by the Nature Conservancy Council. The island is accessible by

Photos: Anne LaBastille

Seen from a Hirta clifftop, the island of Boreray and the stacks of Stac an Armin and Stac Lee rise from the mists of the sea. Boreray has the world's largest breeding population of gannets (Sula bassana). *The St. Kilda island group is owned by the National Trust for Scotland and leased to the Nature Conservancy Council as a National Nature Reserve.*

ferry from Mallaig, but arrangements for housing must be made with local residents, of which there are only a dozen or so.

Rhum, near Canna, is the second most mountainous island in Great Britain. It had been a totally private and exclusive sporting estate for years, but is now owned by the Nature Conservancy Council, and has been a National Nature Reserve since 1957. Many exotic species such as red deer, Rhum ponies, sheep, etc. were introduced, and farming and grazing went largely uncontrolled. Thus, Rhum's soils, forests, and wildlife all deteriorated. At present, the Council is conducting deer and bird research projects and reforestation attempts. The National Trust for Scotland is negotiating with the Council toward possibly operating Rhum's wonderful old castle, Kinloch, as a unique hostel and hotel. This would help preserve the incredible array of paintings, furniture, knick-knacks, player organ, etc., while earning some revenue. Rhum has the potential of being one of the Trust's most intriguing properties, combining luxury living with an island wilderness environment. There is no transportation at present.

Iona, also in the Inner Hebrides, lies off the Isle of Mull and is of great religious significance. Here, in A.D. 563, Columba and his followers came from Ireland to carry the Christian faith into Scotland and northern England. NTS owns 1,887 acres, but not the abbey, other sacred buildings, or historic religious sites. These are maintained by the Iona Cathedral Trust. Ferries provide service from Mull and Oban: cars are not allowed on Iona.

If St. Kilda is the Trust's most *un*inhabited island, then *Fair Isle* is its most isolated *in*habited one. Sitting forlornly between the Shetlands and Orkneys in the North Sea, the island is accessible twice a week in summer by local mailboat or by small aircraft. Because of its remote position, Fair Isle is a haven for migrating birds. Over 300 species have been caught and banded here, some extremely rare.

Fair Isle was formerly owned by Dr. and Mrs. George Waterston. He was a leading Scottish ornithologist and established the Fair Isle Bird Observatory Trust in 1948. The Waterstons transferred everything to NTS in 1954. Although Dr. Waterston died, Irene Waterston still makes frequent trips to Fair Isle and the Observatory for NTS. She is very much a spiritual presence among the residents.

When the Trust took over Fair Isle, 60 people lived there in a fairly poor and isolated condition. The population was in danger of evacuating, as on St. Kilda. In a successful effort to stop depopulation, the Trust began an imaginative program with the Shetland Islands Council and the local people to improve living conditions. A small airstrip was put in, the dock improved, electricity provided by generator and windmill, and communications strengthened. This was done without spoiling the landscape or distrubing the vast numbers of nesting seabirds. Today bird colonies, observatory, and island folk all flourish. Accommodation is available at the observatory hostel. Each summer NTS sends work groups of young people to Fair Isle.

Castles and Country Parks

Two outstanding castles and surrounding country parks are Culzean (near Prestwick airport) and Brodick on the Isle of Arran. Both offer lovely formal gardens and wild flowers, ranger-naturalist services, woodland trails, etc. Culzean looms above a rocky coastline with inviting tidal pools; Brodick couches below the highest peak, Goatfell, (2,866 feet), on the island. Of the two, Culzean is most heavily visited and may be the Trust's most popular lowland property. Lying close to Glasgow and Edinburgh, it attracts close to 300,000 people a year, many from schools and colleges. It is the key link between city life and the rural heritage of many Scots. It may be the one place an inner-city child can hear a thrush, see a stag, or wade into the sea.

The Trust has done wonders at both castles in restoring them to original quality and detail. Culzean was reconstructed by architect Robert Adam between 1777-1792, and has impeccable interiors, romantic parapets, and the famous "General Eisenhower flat," an area reserved for the General during his lifetime, and now a small museum. Brodick, once ancient seat of the Dukes of Hamilton, is full of extravagant trophies, stag heads, paintings, china, and silver, although it is more rustic than Culzean. The latter was an outright gift to NTS; the former, turned over by the Internal Revenue Service after being accepted by the government in lieu of estate taxes.

In addition to owning Brodick Castle and Country Park, NTS also purchased several thousand acres of mountainous country for ridge walk-

ing and rock climbing on Isle of Arran. Thus, visitors may roam about Goatfell, (2,866 feet—874 m), the highest peak, Cir Mhor (2,618 feet—798 m), and camp down in Glen Rosa beside bubbling burns.

Smaller Properties

National Trust for Scotland headquarters in Edinburgh falls under this category, yet is an imposing building in its own right. It ranks as one of Robert Adam's best urban examples. Three houses on Charlotte Square near City Center make up this complex. No. 5 serves as NTS headquarters, No. 6 is the official residence of the Scottish Secretary of State, and No. 7 is partly a museum showing a typical 17th century Edinburgh home.

A far less pretentious and glittering edifice is the Bachelors' Club, a tiny, thatched house where poet Robert Burns and his friends met to debate in 1780. This "wee cottage" is a charming, low-ceilinged, white historical site dedicated to Burns' life. The custodian often recites "To a Mouse" (and other poems) to visitors in a resonant brogue. The Club is open April 1-October 31.

The Highlands

What Culzean is to the lowlands, *Ben Lawers* is among NTS mountain holdings. It is very popular and easy to reach from Perth. Ben Lawers reaches 3,984 feet (1214 m) and offers views of both the North Sea and the Atlantic from its summit. The Trust owns 7,667 acres (3103 ha) along southern slopes which support a rich profusion of alpine flowers, red grouse, buzzards, other highland birds, and many abandoned "shielings" (shepherds' stone shelters). The Trust bought this land in 1950 and erected a Visitor Center in 1972, thanks to the Countryside Commission for Scotland. This government agency advises on the development and conservation of Scottish countryside, yet it cannot own land. (See PARKS, Vol. 4, No. 2)

The most popular place for serious mountain climbers in *Glen Coe and Dalness,* the Trust's 14,200-acre property (5747 ha) in the central Highlands. It offers fine climbing and rambling year-round.

When an improved road went through the glen (1937) increasing traffic and litter, NTS purchased this magnificent stretch with the help of the Scottish Mountaineering Club, Pilgrim Trust and others. The Countryside Commission for Scotland built the Visitor Center, and the Trust operates it, along with the Leishman Mountain Rescue Research Lab where mountain safety techniques are studied. The Trust's philosophy is to lure people in at minimum admission cost, allow them use of the facilities, and convert them to conservation.

Glen Coe's peaks were backdrops for the bloody fighting between the Campbells and MacDonalds the winter of 1692. Today, it is a peaceful place with red deer, wildcats, peregrine falcons, golden eagles, plovers and ptarmigan.

Kintail is another splendid range of western Highland hills. The Five Sisters soar skywards, four of them over 3,000 feet (914 m). The Trust owns 12,800 acres (5180 ha) with large herds of red deer. There is also good fishing in the River Croe. Tent and trailer sites are available.

One of the last places in Great Britain where a person can hike all day and not see anyone else is at *Torridon.* Here one can safely drink most spring and stream water, camp and listen to silence. The Trust's 16,100-acre holding (6516 ha) lies in the northwestern Highlands. The mountains here are quite different, being composed of red sandstone bottoms (750 million years old) and white quartzite tops (150 million years). There are also isolated fresh-water tarns and lochs which invite exploring, bird-watching, and quick swims.

Problems which the Trust faces are how to administer such a complexity of lands and buildings, and to provide just the right rangers or custodians for each place. Temperaments and talents must match landscapes and furnishings.

Red deer at Culzean. Handsome and appealing animals, red deer are found in many parts of Scotland.

Modern-day obstacles with which the Trust must also cope are new hydroelectric and reforestation projects which threaten to inundate or turn land into biologically sterile tree farms. The worldwide spectre of inflation and high gasoline prices also cause worry and keep the Trust actively seeking new members and contributions. It appears that more and more people want to give estates and buildings (for tax purposes) rather than cash. Yet, without endowments or trusts to support real estate holdings, an organization could quickly get into financial trouble.

Nevertheless, the Trust thrives. It manages a spectrum of conservation areas which rivals any place on earth. It cares for seabirds as well as castles, mountains as well as monuments, and in the process it inspires and educates children, communities, and tourists — a splendid raison d'etre.

Dr. Anne LaBastille is a widely-known American ecologist, writer, and consultant on wildlife and conservation of natural areas.

Herbert Dümmler

Altmühltal: Germany's Largest Nature Park

Altmühltal Nature Park lies in southern Germany and comprises essentially the landscapes of the Altmühltal Valley and those of its tributaries, together with parts of the "Frankenalb." with a total area of 3,000 square kilometres, it is the largest nature park in the Federal Republic of Germany. The beauty of the iandscape derives essentially from three features: the Altmühlriver; the juniper-grown slopes and the Jurasic limestone cliffs; and the forests.

The conurbations of Munich (to the south), Nuremberg, Fürth and Erlangen (to the north), Regensburg [Ratisbon] (to the east) and Augsburg (to the southwest) lie within a radius of 100 kilometres from the nature park and are therefore the areas from which the majority of park visitors come. The relatively short distances make it possible to spend weekends and other short periods of leisure in the park, especially as there is easy access by motorway and by train.

This relationship to built-up areas determined the significance and purpose of the nature park in terms of regional planning: the "Naturpark Altmühltal" offers a vast ecological area which provides relief for the adjacent urban centres, with which it has a many-sided interdependent relationship.

Present situation in the Park

A comprehensive up-to-date system of nature conservation in the Park now includes measures for landscape protection. This is undoubtedly justified, since the concept of nature conservation embodied in the Imperial Nature Conservation Act is obsolete and out of step with public opinion and current practice. The theory of protected areas now includes provision for social and economic development. In fact such provision has almost superseded the exclusively protective aspect. Nature protection now entails preserving and planning natural areas and landscapes in both populated and unpopulated areas to provide the basis for human life and environment.

Article 1, paragraph 1 of the Bavarian Nature Conservation Act states that: "Natural areas and landscapes should be protected, cared for and organised as the foundation of human life, environment and recreation."

In the Altmühltal, nature protection was actively pursued long before the foundation of the nature park in 1969. Since that date, there has been no appreciable increase in the number of sites classified as protected areas.

The comparative rarity of areas designated for special protection derives essentially from three causes:

1. Resistance by landowners against such designation is strong. Proprietors do not readily accept the restrictions associated with a nature reserve.
2. Applications to have areas protected are still unpopular. Politicians are therefore — often against their better judgment — not prepared to support attempts to have areas designated for protected status.
3. Keen nature-lovers are afraid — not without some justification — that classification as a protected area will merely attract the attention of the mass of trippers and holidaymakers to the existence of certain beauty spots. As a result of more intense tourist traffic, the "protected" area is jeopardised even more than before.

This undoubtedly applies wherever there is a lack of dependable information on the visitor capacity of the ecosystem or where there are no proper arrangements for organising or directing the flow of sightseers.

In the case of the Altmühltal Nature Park, it should also be taken into account that there has so far been no real threat to potential nature reserves.

The part played by the nature park in conservation

The role of the nature park in conservation has become much more important since the promulgation of the Bavarian Nature Conservation Act in 1973. Section 11 of the Act stipulates that most of the area of nature parks must have the status of a protected area. It has therefore become a statutory requirement for nature parks to ensure the survival of natural habitats; they accordingly acquire important rights of initiative and decision in this sphere. In a notice published by the Ministry for Development and Environmental Affairs, it is stated that: "The main objective of nature parks is reconciling the demands of nature conservation and landscape protection with the requirements of leisure and recreation." Hence, the nature park can act as a specialised consultative institute, for example, in regional planning matters. The provision embodied in Section 11 of the Bavarian Nature Conservation Act was interpreted in the outline programme for rural development as meaning that at least 75% of the area of a nature park must have the status of a protected area. This interpretation has not gone uncontested, for in the opinion of many nature park organisations it should suffice to meet the legal requirement if more than 50% of the total area qualifies as a protected landscape. The current revision of our landscape development and amenity plan proposes 69% of the total area as protected landscapes (February 1982). There will be some difficulties in realizing this goal in the procedure prescribed by law.

As a result of the 75% requirement, the minimum standards for a nature park with regard to landscape quality have increased. At the same time, this has given nature protection a tremendous boost, as considerable areas now have to be classified in the protected category and are thereby no longer available for purposes which do not comply with conservation requirements.

The nature park contributes actively to nature conservation by means of a series of individual measures implemented by its members. Large tracts of the characteristic juniper-planted slopes, for example, are maintained by appropriate upkeep methods; the nature cycle of vegetation is interrupted, namely by removing the pines and spruce which would stifle the juniper bushes, and the biotopes typical of these dry slopes are thus preserved. The animal and plant colonies on these grassy slopes with their shallow rendzina soils are very valuable. As ecosystems, they perform important stabilising functions in the system of natural processes. The plant associations consist of false oat-grass and colonies of semi-dry and dry turf.

On the outcrops of rock and sheer cliffs fully exposed to the sun, there are even rare species of wild grasses which only re-appear in the pontic steppe-lands. Our draft landscape development and amenity plan therefore includes proposals for 41 botanical reserves designed to preserve the scientifically valuable plant systems present there.

In addition to the cases described above, where the nature park had a direct impact on nature conservation, there are a number of achievements indirectly attributable to the mere existence of the park. In the first place, mention should be made in this connection of the recent forestry projects of the Bavarian State Forestry Commission, whose management plans

The Fraŭenschŭh orchid (Cypripedium calceolus) *is one of the endangered plants which would disappear without nature conservation.*

The apollo butterfly (Parnassius apollo melsiailus) *needs the juniper slopes to survive.*

generally extend over a period of 20 years.

Since the foundation of the park, more consideration has been given in these plans to measures which comply with the principles of our nature park management scheme and at the same time have an influence on nature conservation.

Examples of these measures include: a higher proportion of broad-leaved trees on the Altmühl Valley slopes; greater emphasis on rejuvenating measures; planting of indigenous tree species with attractive blossoms or leaf colouring along the edge of plantations and pathways; imposing groups of fully-grown trees left standing for aesthetic reasons (entailing considerably reduced profits in the meantime); broad belts of trees left standing to mask young plantations.

In addition, thanks to the efforts of the nature park "forestry adviser," individual steps are taken by the forestry authorities which constitute an active contribution to nature conservation, such as: the clearing of outstanding rock formations in the forest to enhance the landscape; the cleaning of silted-up forest pools and ponds, previously used as watering places for cattle and sheep, etc.

All these measures serve not only to improve the visual aspect of the landscape and its variety, but they simultaneously enrich it with microbiotopes which constitute an essential contribution towards the active protection of species and habitats.

In the operational plan drawn up for the entire woodlands of Bavaria, all forests serve specific nature conservation functions, such as protecting water resources, maintaining the climate, shielding roads, absorbing pollution, preserving soil, etc. In collaboration with the nature park, certain significant wooded areas have been assigned a corresponding function.

The picture would not be complete without a mention that the nature park itself has sometimes contravened the principles of nature conservation. Along many pathways, for example, too many benches were installed. Shelters were erected in certain vulnerable spots and waste paper baskets were located in places where no proper and regular emptying service was provided.

In the first draft of our amenity plan, too many sites were granted for water sports and too many camping sites were envisaged. Since then, the surplus benches and waste paper baskets have been removed; after consultation with the Nature Conservancy Federation, the excess water sport and recreation areas and camping sites have been reduced to a tolerable level.

There will always be individual cases of conflicting opinions between nature conservation on the one hand and the nature park on the other, since the latter also has to represent the interests of those in need of recreation and relaxation. These aims are inevitably incompatible. In order to ensure the survival of essential natural habitats in the future, an acceptable solution has to be found in every case; there is no room for lax compromising. Wherever the issue is not clear cut, the benefit of the doubt must be given to nature conservation.

Clearing of pines and spruce in order to save the junipers.

Differences Between Nature and National Parks

The role of nature parks and national parks in nature conservation may be regarded as predominantly positive. The mere existence of a nature park reinforces nature conservation, since the areas enclosed in the nature park enjoy greater consideration and attention from the public and the planning authorities. This applies to a much greater degree to national parks. Thanks to appropriate classification in landscape development plans, valuable biotopes automatically acquire the status of protected areas.

Nature parks may contribute by means of information and research to boosting popular demand and obtaining the necessary political support for the classification of nature reserves as a means of preserving elements essential to life.

In this connection, attention should be drawn to the need to place nature conservation activities in the nature pasrk on a scientific basis. This implies that each nature park should have a scientific research station with a visitors' information centre, where possible, offering a wide range of information.

There are at present two national parks in Germany: the Bavarian Forest National Park and the Berchtesgaden National Park.

In both cases, nature conservation is given first place, while recreation is only allowed insofar as compatible with the principles of conservation. Nature protection in national parks means leaving nature to develop as far as possible according to its own laws. National parks should not primarily serve the purpose of preserving characteristic forms of land-use (as nature parks at present do), or to maintain and perpetuate particular phases of development in a landscape. This implies, for example, that all forestry activities are suspended in large sectors of woodland. In the Bavarian Forest National Park, there are now already 4,000 hectares of forest left to develop naturally without human interference. The role of national parks in nature protection is therefore incomparably greater than in nature parks.

Herbert Dümmler is presently forestry advisory for Altmühltal Nature Park, and deputy director of the Park's forestry office. He prepared this case study for the Council of Europe.

David L. Tichnell, Gary E. Machlis and James R. Fazio

Threats to National Parks: A Preliminary Survey

There is world-wide awareness that population growth, industrialization, tourism, resource extraction and other human activities are adversely modifying park environments at an increasing rate (see Elliott 1974; Nelson, et al. 1978). With this awareness is a realization that park managers must look beyond the boundaries of their parks as they develop management approaches for the 1980s and 1990s. Hart, in *A Systems Approach to Park Planning* states:

> . . . within a given land area all parks, no matter how large they may be, or for what purpose they were established, are related to each other, to the use of resources in the landscape which includes them, and to the society which supports them. (1966, p. xi)

This concept of parks as a *system* is relatively new. One result is that strategies to lessen and prevent impacts on protected areas are including more international cooperation and initiatives. For example, technical meetings of the IUCN Commission on National Parks and Protected Areas have been organized around different biogeographical realms. In addition, the Commission has recently expanded its efforts to inventory protected areas worldwide (Harrison et al. 1982 and PARKS, Vol. 7, No. 4).

A problem is that threats to national parks and other protected areas have never been systematically identified. Such information could aid protection efforts by identifying areas for assistance and issues of concern. It would also prove useful in establishing baseline data for monitoring and research efforts. Currently, information on the environmental conditions of many national parks throughout the world is lacking (IUCN 1980; Hales 1982). Identification of threats to parks worldwide would provide both an immediate and long-term benefit to protected areas management.

As part of a research effort conducted by the University of Idaho Cooperative Park Studies Unit (CPSU), and supported by the World Wildlife Fund (USA) with assistance from the U.S. National Park Service, a questionnaire was distributed to park professionals and leaders attending the 1982 World National Parks Congress in Bali, Indonesia. This international meeting provided an excellent opportunity to learn more about the ecological health of protected areas from leaders in the world park movement. In addition, the meeting provided an opportunity for testing and improving one method for gathering such information. In this paper we describe the results of this preliminary study.

A Theoretical Perspective

The complexity of park systems requires a theoretical perspective that considers a variety of changing social and biological factors. As part of our long-term research strategy, the problem of documenting threats to national parks was approached from the perspective of human ecology. The essence of this general approach is a recognition of *Homo sapiens* as a part of nature. The human ecosystem is defined by the interrelationship of population, social organization and technology in response to an environment (Duncan 1964). The interaction of these variables is human ecology's major concern.

Figure 1 illustrates this perspective applied to parks. The park ecosystem is comprised of several interdependent subsystems: the biophysical

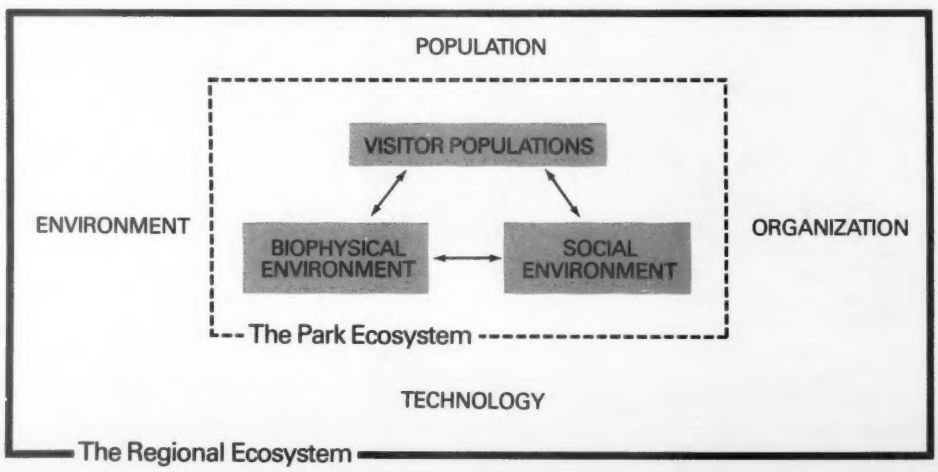


Figure 1. *A Human Ecological Framework Applied to Parks*

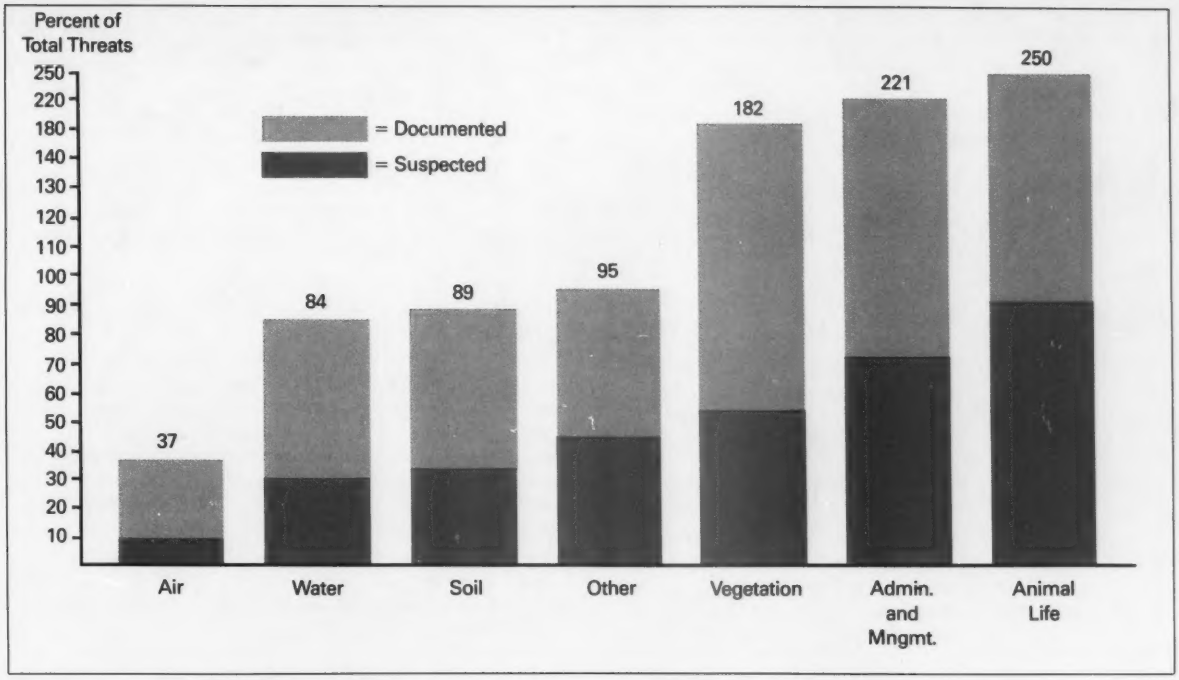


Figure 2. *Reported Threats by Resource Subsystem*

environment (air, water, soil, wildlife and so forth), the social organization (including administration and management) and the visitor populations. This park ecosystem is in turn embedded in a wider regional system, and is influenced by the population, organization, technology and environment that makes up the surrounding region.

These human ecosystems are dynamic and adaptive; relationships between human populations and park resources can change over time. For example, increased international tourism due to a favorable monetary exchange rate may lead to increased park visitation, which may cause soil compaction in popular but fragile habitats. Thus, a social change external to a park can result in an alteration of the park's biophysical environment.

While these changes are often adaptive, such as wildlife response to habitat loss, the process of adaptation when applied to humans is more complex.

For example, land-use practices adjacent to park boundaries (mining, agriculture, forestry, industrial development, tourism and so forth) must necessarily affect the resource. Management strategies for managing human activity within park boundaries are also likely to cause biological change. Human ecology asks: What strategies of adaptation are available, and what are their consequences?

Methods

A twelve-page questionnaire was designed to survey conference participants about threats to natural resources in their country's national parks. More than 300 questionnaires were printed in English and distributed to participants at the conference, to be returned to a member of the research team attending the meeting.

The questionnaire was designed around the ecological framework described earlier. Resources were grouped into seven main sub-systems: air, soil, vegetation, water, animal life, management and administration, and a miscellaneous category. Each category had a list of potential threats that applied specifically to it. Threats were defined as activities of either human or natural origin which have the potential to cause significant damage to park resources or serious conflicts with the objectives of park management. For each park subsystem, the respondents were asked a series of questions regarding potential threats to their country's national parks. The questionnaire also asked for the educational background, nationality, experience and official position of each participant, so that a profile of respondents could be made.

Sixty-four questionnaires were returned, representing 37 different countries, for a response rate of 20 percent. Five questionnaires were disregarded due to missing data. Of the remaining 59 respondents, 23 held central government positions, 12 were affiliated with conservation organizations, 12 were from educational institutions, 8 worked at a specific park, and the remaining 4 had a variety of occupations. Fifty-nine percent had more than ten years' experience in park management.

This study has several limitations. First, managers' perceptions of threats may not represent the actual ecological problems. That is, a manager may perceive overcrowding as threatening riparian habitat while an unrecognized process such as chemical pollution is causing the environmental change. Second, the questionnaire was only available in the working language of the conference, English. Third, the response rate (20 percent) and number of countries represented (approximately half of the nations attending the meeting) means that the results cannot be generalized beyond those who participated in the study. The results can suggest the general pattern of threats facing national parks in many countries, and can show the kinds of data such surveys may provide.

General Results

A total of 958 threats were reported as suspected or documented. Figure 2 shows that reported threats existed for all park subsystems, with vegetation, administration and animal life accounting for 68 percent of the total. The least number of reported threats were associated with the air subsystem.

The 10 most reported threats are listed in Table 1, along with the subsystem they were reported to affect. Not surprisingly, several of these are complex socio-cultural processes, such as conflicting land uses, local attitudes and unlawful entry. These threats are clearly linked to the regions adjacent to park boundaries. The most commonly reported threat was a lack of staff personnel.

Table 1
Ten Most Reported Threats

Number of Respondents Reporting	Percent of Respondents Reporting	Threat	Threatened Resource Subsystem
40	68	Lack personnel	Administration
36	61	Removal of vegetation	Vegetation
35	59	Habitat loss	Animal life
35	59	Illegal removal of animal life	Animal life
33	56	Conflicting land uses	Administration
31	53	Fire	Vegetation
31	53	Local attitudes	Administration
29	49	Unlawful entry	Administration
27	46	Erosion	Soil
26	44	Exotic plants	Vegetation

The results for each park subsystem are briefly summarized below.

1) *Administration and Management*
Fifty-five of the respondents (93%) indicated that there were significant administrative and management problems in their national parks. The most common of these were lack of personnel, conflicting land uses, local attitudes and unlawful entry of local people. This subsystem had the largest number of documented threats.

2) *Animal Life*
Fifty-five respondents (93%). The most common threats were habitat loss, illegal removal of wildlife (poaching), human harrassment and habitat change.

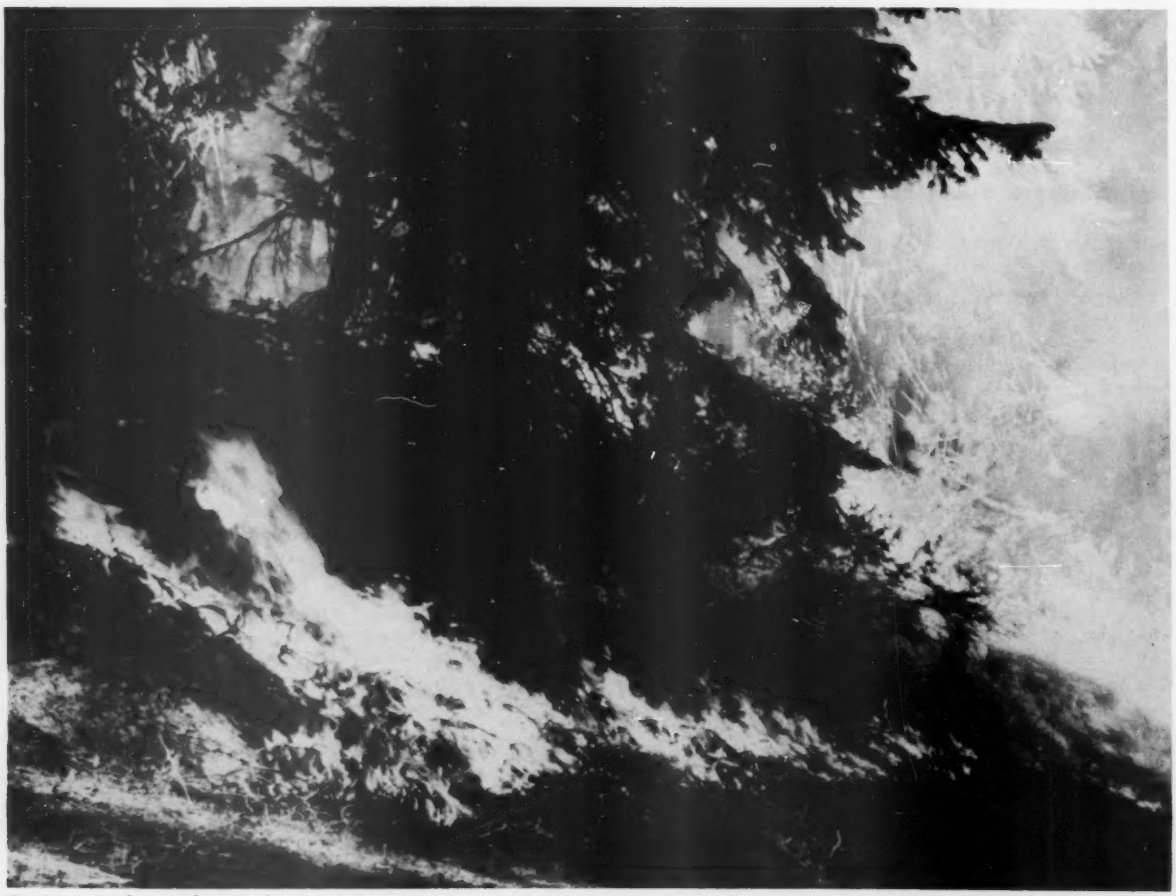
3) *Vegetation*
Fifty-four respondents (92%). Major threats included removal of vegetation, fire and exotic plants.

4) *Water*
Thirty-nine respondents (66%). The most common problems included chemical pollution, increased demand, and blocked river or stream flow.

5) *Soil*
Thirty-three respondents (56%). Common problems were erosion, inadequate cover of vegetation, and compaction.

6) *Air*
Twenty-three respondents (39%). Major problems included smoke, chemical pollution, and dust.

7) *Other*
The most commonly cited problems were mining, litter, degraded scenic views, and noise.



Fire is a major threat to the natural resources of nearly every protected area anywhere in the world. Photo: National Park Service.

Discussion

As indicated earlier, human activities outside park boundaries may be a major source of threats to parks. The general processes of technological change, industrialization and economic growth may significantly alter the amount, intensity and kind of threats parks may face (Nelson et al. 1978; Blower 1982). Thus it may be fruitful to explore the linkages between industrialization and threats to parks.

To do so, the 37 countries represented in this study were divided into three general categories — less industrialized, industrialized and more industrialized. The percentage of a country's labor force in the agricultural sector was used as an indicator of industrialization. Using data primarily from the World Bank (1981), countries with less than 20 percent of the labor force in the agricultural sector were categorized as "more industrialized," those with 20-80 percent of the labor force in agriculture as "industrialized," and those with more than 80 percent in agriculture as "less industrialized."

The kinds of reported threats varied by stage of industrialization. For example, threats to air quality were reported by only 14 percent of the respondents representing less industrialized countries, and by 52 percent of those from more industrialized nations.

A comparison of the three most common threats in countries at each stage of industrialization shows further variation. Respondents from less industrialized countries reported their most common threats as removal of vegetation, unlawful entry by local peoples and illegal removal of animal life. Those from industrialized countries reported lack of personnel, illegal removal of animal life, and removal of vegetation. Finally, respondents from more industrialized countries indicated exotic plants, habitat loss, and exotic animals as the most common threats.

Implications

This preliminary study revealed, not unexpectedly, that leaders in the protected areas movement perceive substantial and wide-ranging threats to the natural resources of national parks worldwide. Although the results must be read with caution, they reveal varying degrees and intensity of problems for all subsystems. Many threats are not well documented. Hence additional efforts are needed immediately to learn more about them. A lack of personnel, identified by the respondents at the Bali Conference as the most widespread problem, may seriously hamper these efforts.

Several of the reported threats, such as the unlawful entry of local peoples, pose special management problems. As is widely acknowledged, national parks need to be successfully integrated into the socio-economic infrastructure of local communities. The comparison of threats to national parks between countries at different stages of industrial development suggests some interesting relationships meriting further attention. More importantly, it illustrates the types of causal relationships that could be investigated once data on threats are systematically gathered. These relationships are particularly important to planners and managers of protected areas since they may suggest preventive strategies for resource protection.

Currently, the University of Idaho CPSU is conducting a second phase of this research. Based upon revision of the Bali questionnaire, a more detailed questionnaire is being sent to park managers of 135 national parks around the world. Special attention is being given to choosing a sample representing countries at different stages of industrialization, along with a diversity of biomes. It is hoped that this on-going study will provide further information about the nature and causes of threats to national parks.

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PARK TECHNIQUES

Wayside Exhibits Enhance Park Interpretation *Jean R. Packard*

Properly designed and sited wayside exhibits and signs can provide immeasurable pleasure for visitors to parks and protected areas, discourage vandalism and lessen damage caused by thoughtlessness or ignorance.

Wayside exhibits can range from the simple to the elaborate—from a hand lettered sign on a stake to a fine building filled with expensive, carefully engineered exhibits. Most, however, fall somewhere between these two extremes.

In determining the need for any sign or wayside exhibit, the first questions to be addressed are:

Is the message needed?

What should the message be?

How should it be presented?

Is a protective structure necessary?

Interpretive messages are likely to be most needed and most effective when provided at important points of visitor impact, where the visitor instinctively pauses to look and to enjoy. Most messages should be friendly and informal, although some may require more imaginative treatment. Statements on signs and wayside exhibits should be closely related to what can be seen from their location. Readability and reliability are to be sought in all messages. Sometimes words and materials can be chosen which convey local flavor, which is desirable.

Certain basic principles of location, materials and design apply to most park exhibits, including:

Site Selection

The siting of any sign, marker or wayside exhibit is all-important. Standards that assist in proper location include:

1. Select the best examples of natural or historic sites, objects, features, or structures which tell a part of the park story or contribute to an important supplementary theme or story.
2. The place for the facility should be easily found and readily useable by the visitor. The subject itself should be readily recognizable, and the site should afford the broadest opportunity to interpret the feature with clarity.
3. If several vantage points are available, select the one having the greatest intrinsic or potential visitor appeal from the standpoint of immediate surroundings.
4. Select the sites which meet obvious needs for interpretation, but be reasonable in the distribution of these facilities; avoid overcrowding.
5. Avoid dangers to visitors and installations.
   a. Natural hazards:
      (1) Rockfalls
      (2) Flooding
      (3) Wind damage
      (4) Overhanging trees
      (5) Unprotected cliffs and dangerous walks slippery when wet or icy
      (6) Steep grades
   b. Traffic and other man-caused hazards:
      (1) Blind curves
      (2) Lack of adequate parking space
      (3) Lack of warning or approach signs
6. Normally, select points which will be visited by reasonably large numbers of people; but do not exclude interpretation of outstanding points which may be lightly visited.
7. Select points where features will not be damaged by excessive use such as a natural process arrested or an irreplaceable archeological or historical structure destroyed.
9. Select sites which provide for the maximum comfort of visitors in their personal enjoyment and study of the feature. So far as possible, avoid sites with distracting influences.

Placement

Placement of interpretive signs and markers should be governed by the following standards:

1. The facility should be so placed that there is little or no question in the mind of the visitor as to the identity of what is being interpreted. Generally, placement should be such that the text may be read, and the natural or historic subject observed, without requiring the visitor to change position.
2. The facility should be sufficiently visible to serve its purpose without intruding unduly upon the scene.
3. Place the facility in a position so that it may be reached and used with greatest physical ease. Ordinarily, the position selected should not require the visitor to stoop, stretch, exert himself unduly in climbing, etc.
4. Normally, signs should be placed so that the bottom of the sign panel is 18 to 24 inches above ground, dependent on its size. Occasionally a sign must be read above parked automobiles or other obstructions, which justifies a longer leg or standard. This should be avoided where possible.

Materials

The choice of materials for signs and exhibits is primarily limited only by budgetary constraints. There is a wealth of commercial products available, ranging from attractive hand lettering on waterproof paper or cloth to the most elaborate permanent exhibits involving silk screening, plastics, metals of various kinds, routed wood, self-adhesive letters, etc.

Native materials should be used where they will contribute to the harmony of the setting and theme of the area. Figure 1 indicates an attrac-

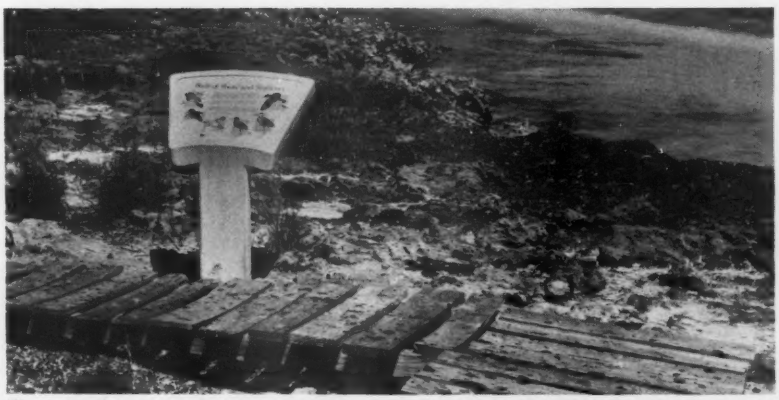


Fig. 1: *Weathered wooden planking provides a firm walkway for visitors as they approach the cast concrete display. The color of the concrete blends into the rocky landscape.*

Fig. 2: *Path leads to display area, while barrier keeps visitors off the steep vegetated banks just beyond. Similar paths lead to the beach, providing access and preventing erosion.*

Fig. 3: *A palm-wood post and crossarm support this routed wood sign in Everglades National Park, a subtropical area abounding in palm trees.*

tive choice of native and man-made materials deliberately chosen to withstand constant salt-water deterioration. The interpretive sign is cast concrete, while the walkway is constructed of naturally weathered wood. In such a case, use of a concrete pathway could have been intrusive.

Similarly, plant materials native to the site should be used as backgrounds and to help tie the sign to its site in a natural manner.

Design

Exhibits and signs should be composed of simple elements arranged to present the information in a clear and straight-forward manner. First impressions of an area are often influenced by wayside exhibits or other forms of communication. Size, configuration, color, letters, placement and message must be decided upon and integrated before work begins. While consistency of appearance and materials can provide a theme throughout an individual area or an entire system, care should be taken that excessive similarity does not lead to inattention or indifference on the part of the visitor.

Careful design and placement can also serve as an unobtrusive but effective visitor control. A simple fence behind an interpretive sign can be incorporated into the message while keeping visitors away from a fragile area (figure 2). Directional signs that become part of a trail keep visitors from wandering off the path, while strategically placed interpretive signs or exhibits keep the flow of visitors moving in one direction and on a designated walkway.

Native materials used wherever possible can lessen the cost of exhibits, provide additional visual interest to the facility itself, and often are more durable than other materials (figure 3).

Self guided tours are an important interpretive feature of most natural areas, giving visitors the opportunity to explore at their own pace and inclination, while lessening the need for park personnel. A simple theme figure or object can tie together the disparate pieces of such a trail — a silhouette of a soldier in an historic fort, or an easily recognized native animal in a game park can keep visitors moving from point to point while focusing their attention on the primary purpose of the area. Such markers are especially important at every point where a visitor has a choice of routes (figure 4), such as forks in the trail, or as indicators of hazardous areas. With minimal wording, these figures can indicate direction, destination, distance, walking time, or provide a key for a printed guidebook.

Care must be taken in the design of directional arrows or similar markings. Many an attractive sign has been disfigured by poorly designed or hard to read arrows. These symbols should be carefully studied for each sign and not merely compressed into the design where their function may be lost. The design and construction of each sign or marker should be studied in complete detail prior to installation to eliminate causes of premature decay and rust, and to assure the longevity and permanency of the exhibit (where appropriate).

Shelters

Certain exhibits either require or are enhanced by some type of protective structure to provide fuller interpretation, as well as give the visitor a chance to rest and be sheltered from the elements. Such protection affords the opportunity for more detailed displays to be absorbed in relative comfort (figure 5).

There are many different types of shelters or buildings that prove useful and attractive, de-

Fig. 4: *Painting of a sylized Indian points the route and provides design continuity on self-guided trail through American Indian ruins.*

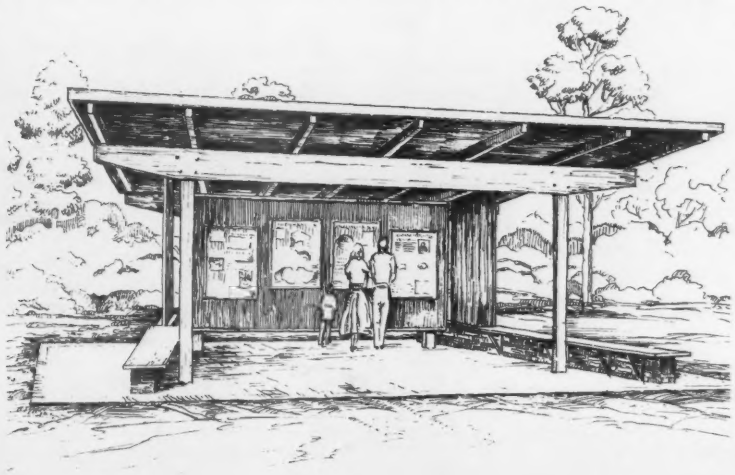


Fig. 5: *This roofed structure, offering benches and vertical mounted exhibits, shelters both visitors and display from sun and rain.*

pending upon location. Grass rondevals are appropriate to the African plains, for example, or stone structures in Great Britain, palm thatch in tropical countries, or heavy timbers in forested mountainous regions. Such use of natural native materials not only indicates the specific points of interest, but provides an economic advantage to a tight budget.

The US National Park Service has developed a standardized kit for an exhibit structure which provides three 38 × 46 inch (96 × 117 cm) panels on which displays can be arranged under a roofed shelter. The metal components and a full set of plans are provided to the individual park manager within the NPS system who then utilizes available materials to build the structure. Such an arrangement allows for economies of scale in ordering metal components in large numbers, while allowing park managers to save money by using readily available, less expensive local materials. This arrangement also encourages use of native materials, and gives park managers the flexibility to provide imaginative and creative interpretation.

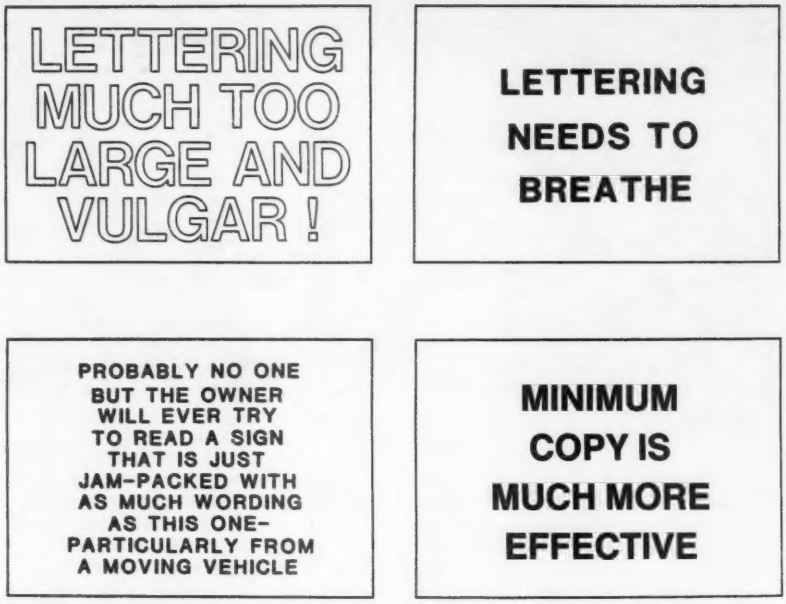

LETTERING MUCH TOO LARGE AND VULGAR !
LETTERING NEEDS TO BREATHE
PROBABLY NO ONE BUT THE OWNER WILL EVER TRY TO READ A SIGN THAT IS JUST JAM-PACKED WITH AS MUCH WORDING AS THIS ONE- PARTICULARLY FROM A MOVING VEHICLE
MINIMUM COPY IS MUCH MORE EFFECTIVE

Fig. 6: *A sign's space is just as important as the letters or illustrations themselves. If the message is short and the board large, arrange the message in a well-placed area within it — do not try to stretch it out to fill the entire space.*

Text

Writing for signs is completely different from any other text wording. Clear, logical and precise thinking is essential to condense an inscription to its simplest form and present it logically without boring the reader.

Short sentences, with words of few syllables, uncomplicated by prefixes and suffixes, go far to insure readibility. Academic phrases should be avoided or carefully explained; both scientific and common names should be listed wherever possible. In many cases, it is how the text is written, not its length, that determines whether it will be fully read and completely understood.

A checklist of key points to observe in the composition of text includes:

1. Captions, if used, should have 'headline" qualities in style and meaning.
2. Do not repeat the caption in the first line of the text.
3. Get the action and interest expressed in the opening sentences of the text.
4. Be dynamic in getting to the heart of the story to be told and answer the question: "What happened here?"
5. Avoid the use of the passive voice; replace the verb "to be" with the action or participial form of the appropriate verb. Use words conveying a sense of movement.
6. Make a few words tell the full story.
7. Avoid the use of technical or unfamiliar words as far as possible, since they make the text difficult for the visitor to understand and his interest in the site may quickly wane.

Lettering

Good typographic practices should be followed in laying out narrative or information signs requiring several lines. Usually they should be composed in legible capital and lower case letters rather than all capitals.

In every case, the lettering should be of simple form, adequate size and executed to withstand weathering. The number of different *sizes of letters* should be kept to a minimum; one if possible, two if they increase the readability, but never more than three — beyond that point readability is almost sure to decrease as the jumble of sizes increases (figure 6).

If the message is complex or lengthy, every attempt should be made to break it down to its component parts. Three separate pictures, each with its own specific caption, is far preferable to one large picture illustrating three points with a large block of type you hope will be read and understood at one time.

Signs to be read from moving automobiles require lettering of strong legibility, discernible at a distance sufficient to permit the sign to be read at the normal speed of travel at that point. Letters should be at least two inches high, and signs should be large enough to accommodate the message required.

Lettering on signs to be read by standing or seated people at close range should only be large enough to be clearly legible from the spot where the visitor will normally read it. Larger eye-catching captions may encourage passing visitors to stop and read the entire message.

Illustrations

The old saying, "one picture is worth a thousand words," was never more appropriate than in natural area interpretation. Illustrations need to be as carefully selected and edited as exhibit text. If color is used, it must be accurate (especially to describe wildlife), although good black and white pictures can be even more effective than color, when utilized properly.

Some exhibit cases can be constructed to combine illustrations, text and actual items, such as primitive tools or other small objects. "Easel type" displays, with a liftable top (figure 7) can prove durable and weather-resistant, as well as provide double the display space in a limited area.

Fig. 7: *An aluminum box with a drop cover and a glass covered display contains artifacts and information. These can be mounted on a guard rail or freestanding post. Larger cases, without the glass cover, can protect trail registers and guidebooks.*

Color

Colors should be chosen to complement their surroundings rather than compete with them. They must make the sign visible but not spoil the environment.

When more than one color is used, they must be chosen carefully so as not to overpower the area. Be aware that approximately 10 percent of the population is red/green color-blind, so make sure your contrasts are clear when using these shades. The partially blind will also have trouble distinguishing text if there is not sufficient contrast.

The following table is a concensus of several authorities on the comparative legibility and visibility of certain color combinations. The highest or best legibility is listed first.

BLACK letters on a YELLOW background
GREEN letters on a WHITE background
RED letters on a WHITE background
BLUE letters on a WHITE background
BLACK letters on a WHITE background
RED letters on a YELLOW background
WHITE letters on a BLUE background
WHITE letters on a RED background
WHITE letters on a GREEN background
WHITE letters on a BLACK background

Coping with Damage

Every manager has to deal with senseless destruction of signs and exhibits. There are a few helpful guidelines, although the problem will undoubtedly continue to grow as more and more people flock to their parks:

1. Careful selection of materials which can be easily cleaned.
2. Easily replaceable signs at points of heavy use, such as along well traveled roads or well populated areas.
3. Keep the site well maintained; carefully managed areas seem less prone to damage.
4. If closing an area, explain the reason. "Keep Out" often annoys visitors, whereas "trail closed to allow vegetation to recover" provides an incentive to use an alternative route.
5. Reinforce the idea that the parks belong to those who use them. People are less inclined to damage their own possessions, or to condone such actions in others.
6. If an area has been damaged by thoughtlessness or overuse, turn it into an exhibit. Show what has happened, why, and enlist the visitor's active participation in the recovery.

Damage, of course, is not limited to the human variety. Wildlife and domestic stock can also cause problems. Occasionally the remedy may be as simple as wrapping a strand of barbed wire around a post where animals have been rubbing (figure 8), or moving the sign away from a well-traveled animal trail. Substituting metal posts for wood will discourage gnawing animals.

In some cases, the only certain remedy to damage is removal of the offending signs completely. For example, if a sign is constantly being riddled with bullet holes by target-shooting vandals, there is little use in replacing or repairing it.

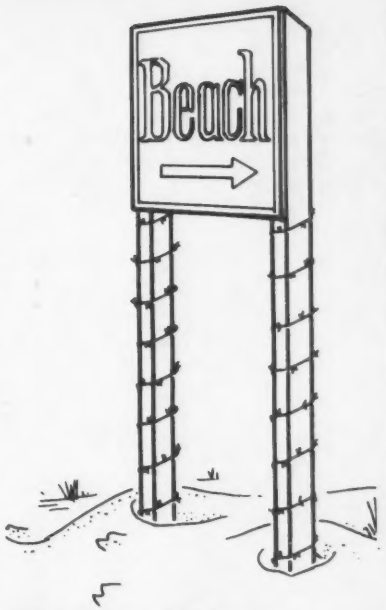


Fig. 8: *Rubbing animals (and some sign vandals) can be discouraged by winding barbed wire around posts about 3 to 5 inches (10 to 15 cm) apart. Signs should be placed higher than the animals that use the area.*

Temporary signs

Since no natural area remains constant, there are instances where a temporary sign or exhibit can provide a useful form of interpretation. (Examples are shown in figures 9 through 12.) The advantages of such displays include:

1. An opportunity to update information speedily and effectively as changes occur. This increases the enjoyment of repeat as well as first time visitors.
2. Displays are relatively inexpensive and easy to make, providing the opportunity and incentive to interpret temporary points of interest with minimal personnel time and cost.
3. The displays can be replaced quickly if they are vandalized or otherwise damaged.

Conclusion

Wayside exhibits, signs and other informative materials come in a bewildering array of sizes, shapes, colors and materials, some of which we have attempted to touch upon. In the final analysis, it is important to remember that these exhibits are not automatically an aid to site management and interpretation. There are a number of advantages and disadvantages:

Advantages

Signs can provide information and explanation at or close to the feature being explained.
The production and normal maintenance costs are relatively low.
They can be changed, updated or removed as needs change.

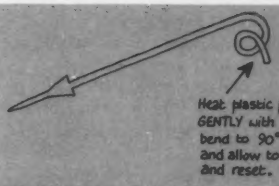


Fig. 9: *Metal electric fence posts make excellent temporary displays. Measuring about 1 m (3 ft), they have a plastic "pigtail" on top which can be heated gently and straightened to form a right angle.*

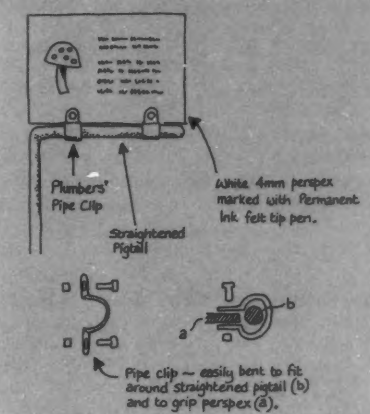

Plumbers' Pipe Clip
Straightened Pigtail
White 4mm perspex marked with Permanent Ink felt tip pen.
a
b
Pipe clip — easily bent to fit around straightened pigtail (b) and to grip perspex (a).

Fig. 10: *Assembly of a temporary display using electric fence post.*

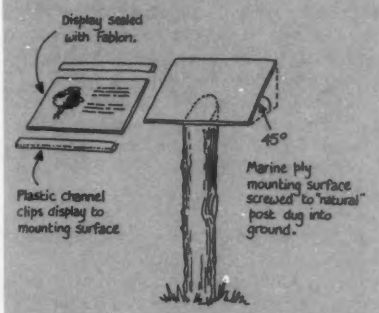

Display sealed with Fablon.
45°
Marine ply mounting surface screwed to "natural" post dug into ground.
Plastic channel clips display to mounting surface

Fig. 11: *Semi-permanent display post with text or pictures mounted on hardback boards and sealed with clear plastic, then clipped to marine plywood mounting faces with wide plastic channeling. Such displays can be changed quickly and easily.*

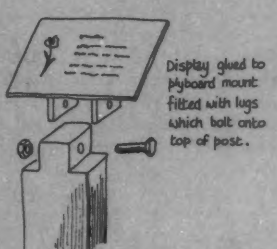


Fig. 12: *Detachable head display post allows replacement of the entire display board as required.*

They can be unobtrusively sited.
They can be in place at all times and are not subject to opening hours.
They do not require expensive staffing.
They can be used at the pace of the individual.
They can incorporate visual images as well as words.
They can be photographed by visitors as personal souvenirs.
As a management tool they can save staff time and cost.

Disadvantages

Signs are passive and require some mental effort from visitors.
They provide one-way communication only — they cannot answer back.
They cannot normally incorporate special effects such as sound reproduction without wardening/management problems.
They may attract unwelcome attention to a particularly vulnerable feature.
If badly designed, sited or constructed they are vulnerable to vandalism and weathering.
If badly designed and sited they can confuse rather than inform.

Signs and exhibits must be considered as part of an overall site management plan if they are to be successful.

A properly designed exhibit adds immeasurably to the pleasure and knowledge of every visitor who stops to read it. A bad sign or exhibit is worse than none at all.

Jean R. Packard is editor of PARKS

Credits: Fig. 6, Countryside Commission for Scotland; Fig. 8, Grist, July 1980; Figs. 9-12, Royal Society for the Protection of Birds; all others, US National Park Service. Portions of the text material were adapted from National Park Service publications, "Standards and Guidelines for Roadside Interpretive Facilities" and "Sign and Wayside Exhibit Handbook." Special thanks to Raymond S. Price, Chief, Division of Wayside Exhibits, National Park Service.

Rafts for Terns

The Royal Society for the Protection of Birds, Bedfordshire, England, has devised two types of floating rafts to provide safe and stable nesting sites for common terns.

Observations of terns nesting in the Lee Valley and in Norfolk on unnatural sites appear to show that the choice of materials and structure of the rafts are not critical. Corrugated iron sheets and sunken boats have both been used successfully. Although the rafts are primarily intended for terns, they are used by other water birds during the winter months, including cormorants who use them as drying areas.

The major criteria for positioning the rafts seem to be maximum security and lack of disturbance. Terns using the rafts fished away from the nesting lagoon and took the young, when fledged, to a suitable feeding area on a nearby gravel pit.

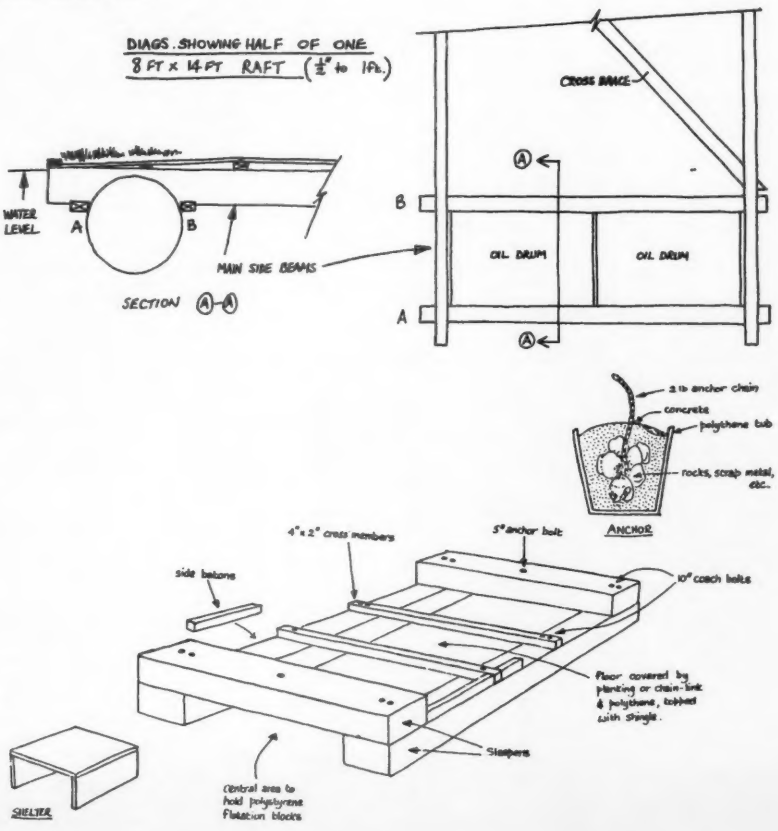
Pictured are two methods which have proved economical and acceptable to the birds:

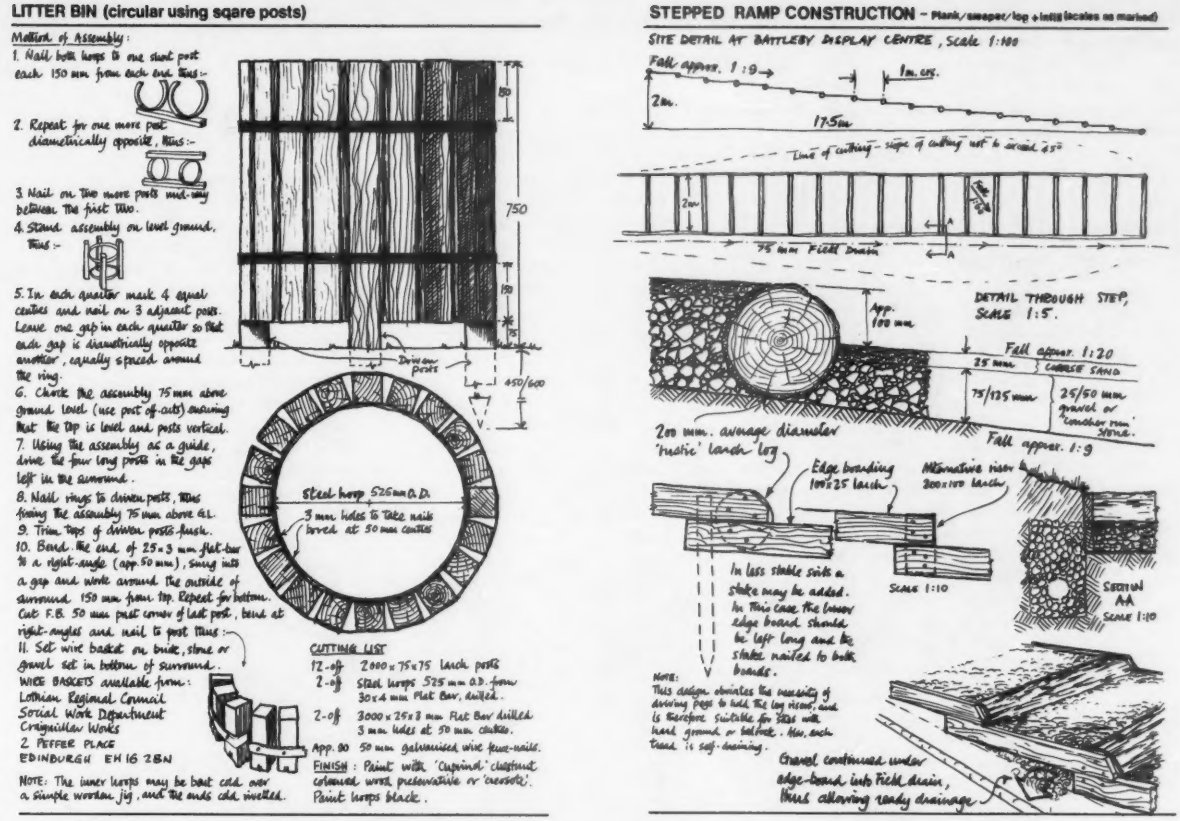
Figure 1 illustrates timbers fixed to oil drums. A nearby industry donated 11 drums to make 3 rafts (which were eventually connected) totalling 27 square yards. The drums were lavishly coated with bitumastic paint. The problem of fixing timber on steel was avoided by arranging timbers so that the structure simply rested on the drums as shown. Bearers A and B (4 inches by 3 inches) were slightly less than the drum diameter and these, together with the main side beams, kept the drum in place. The main beams supported a 4" by 2" framework, which in turn supported large plywood sheets slightly tilted to assist drainage. At this stage only ⅔ of the drum was submerged, which made launching and interconnecting fairly easy. After loading turf and coarse gravel the drums became totally immersed, with only some timberwork exposed. Natural rocks were loaded on to sink it to the last inch or so. The anchors consisted of 1-inch diameter nylon ropes tied around kerb stones.

Saltmarsh turf was used to cover ⅓ of the raft, and meadow turf for the rest (except for a small area of shingle) which, with the rocks, provided hiding places for the fledglings.

Figure 2 makes use of polystyrene flotation blocks and sleepers, making the use of drums unnecessary and providing light weight durable rafts. The floor can be planking or chain link fencing covered with polyethelene and topped with shingle or turf.

(Information and sketches provided by Norman Sills and Peter Martin, RSPB)




LITTER BIN (circular using sqare posts)
Method of Assembly:
1. Nail both hoops to one short post each 150 mm from each end. Thus:-
2. Repeat for one more post diametrically opposite. Thus:-
3. Nail on two more posts mid-way between the first two.
4. Stand assembly on level ground. Thus:-
5. In each quarter mark 4 equal centres and nail on 3 adjacent posts. Leave one gap in each quarter so that each gap is diametrically opposite another, equally spaced around the ring.
6. Check the assembly 75 mm above ground level (use post off-cuts) ensuring that the top is level and posts vertical.
7. Using the assembly as a guide, drive the four long posts in the gaps left in the surround.
8. Nail rings to driven posts, thus fixing the assembly 75 mm above G.L.
9. Trim tops of driven posts flush.
10. Bend the end of 25 x 3 mm flat bar to a right-angle (app. 50 mm), fixing into a gap and work around the outside of surround 150 mm from top. Repeat for bottom. Cut F.B. 50 mm past corner of last post, bend at right-angles and nail to post. Thus:-
11. Set wire basket on brick, stone or gravel set in bottom of surround.
WIRE BASKETS available from:
Lothian Regional Council
Social Work Department
Craigmillar Works
2 PEFFER PLACE
EDINBURGH EH16 2BN
NOTE: The inner hoops may be best cut over a simple wooden jig, and the ends cut welded.
Steel hoop 526mm O.D.
3 mm holes to take nails bored at 50 mm centres
Driven posts
CUTTING LIST
12-off 2000 x 75 x 75 larch posts
2-off Steel hoops 525 mm O.D. from 30 x 4 mm Flat Bar, drilled.
2-off 3000 x 25 x 3 mm Flat Bar drilled 3 mm holes at 50 mm centres.
App. 90 50 mm galvanised wire flow-nails.
FINISH: Paint with 'Cuprinol' chestnut colonial wood preservative or 'creosote'. Paint hoops black.
STEPPED RAMP CONSTRUCTION - Plank/sleeper/log + infill (scales as marked)
SITE DETAIL AT BATTLEBY DISPLAY CENTRE, Scale 1:100
Fall approx. 1:9
1m. ctrs.
2m.
17.5m
Line of cutting - slope of cutting not to exceed 45°
75 mm Field Drain
DETAIL THROUGH STEP, SCALE 1:5.
App. 100 mm.
Fall approx. 1:20
25 mm
COARSE SAND
75/125 mm
25/50 mm gravel or 'crusher run' stone.
200 mm. average diameter 'rustic' larch log
Fall approx. 1:9
Edge boarding 100x25 larch
Alternative riser 200x100 larch
In less stable soils a stake may be added. In this case the lower edge board should be left long and the stake nailed to both boards.
SCALE 1:10
SECTION AA SCALE 1:10
NOTE: This design obviates the necessity of sawing post to hold the log riser, and is therefore suitable for sites with hard ground or bedrock. Also, each tread is self-draining.
Gravel continued under edge-board into Field drain, thus allowing ready drainage.

These designs are from the Countryside Commission for Scotland.

BOOKS AND NOTICES

Mammals of the National Parks. 1982. Richard G. Van Gelder. The Johns Hopkins University Press, Baltimore, Maryland 21218/USA. 310 pages. $24.50 for the hardback issue, $8.95 for paperback.

For nature lovers and serious visitors to national parks and other protected areas there are few, if any, substitutes for guidebooks. In consequence, production of this kind of literature for many years has been a major publishing enterprise . . . with good, bad, and indifferently successful results. Van Gelder's effort should be among the best.

The book is well laid out in two basic sections. The front half treats each of the parks, 48 of them, with a description, map, discussion of each park's mammalian fauna, and a checklist for those visitors and keen observers who like to keep records of what they see.

The second half of the book discusses all of the mammals found in the parks in much greater detail. They are all included, even the whales — great and small — which can be observed from some of the national parks. These marine mammals get almost 5 pages of text; the Virginia oppossum, as another example, gets two-and-a-half pages, including a picture. Common and scientific names, references and an index are provided.

Altogether, this is a well-conceived and carefully prepared book that should serve its audience very well indeed.

—R.I. Standish

World Environment Handbook: A Directory of Government Natural Resource Management Agencies in 144 Countries. The World Environment Center, 605 Third Ave., NY, NY 10158, USA. Paper, 121 pages, US$25 plus $2 postage ($4.50 air).

This attempt to provide a directory of names and addresses of individuals and agencies who deal with environmental policies falls woefully short of the claims it makes for itself.

A small (4 × 6½ in—10 × 15.6 cm), poorly reproduced booklet, it shows a surprising lack of knowledge of or research in countries with large and well-known environmental agencies.

Examples of glaring—and easily correctible—omissions include: Africa—no reference to the national park agencies of Kenya or of South Africa; or the Department of Wildlife and Game of Ghana.

United Kingdom has only two listings, both of the Department of Environment. There is not even a country listing for either Scotland or Wales.

United States contains four listings only—two for the Department of State (hardly noted for environmental policy making), the Council on Environmental Quality (an advisory body only), and the Environmental Protection Agency (listing the wrong director). Conspicuous in their absence are the Department of Interior, National Park Service, Bureau of Land Management, Forest Service, and Soil Conservation Service (all located within 300 miles of

the World Environment Center).

The omissions and errors in this Handbook render it useless to anyone unfamiliar with a country to rely on its information in contacting decision makers. The expensive purchase price would be better devoted elsewhere.

—Jean R. Packard

International Biosphere Reserve Congress

The first International Biosphere Reserve Congress will be held Sept. 26—Oct. 2, 1983, in Minsk, Byelorussia, USSR. The Congress is jointly organized by Unesco, UNEP and the USSR in close cooperation with FAO and IUCN.

Participants are specialists in conservation, biosphere reserve managers, scientists undertaking conservation-related research in protected areas and specialists in environmental monitoring, education and training.

Biosphere reserves form an international network of protected areas in which an integrated concept of conservation is being developed combining the preservation of ecological and genetic diversity with research, environmental monitoring, education and training.

For further information, contact the Division of Ecological Sciences, Unesco, 7 Place de Fontency, Paris 75700, France.

New International Biosphere Reserves Added to System

At the last session of the Bureau of the International Co-ordination Council of the MAB Programme, on 19-21 April 1983, 12 new biosphere reserves were included in the network. These are:

Chile: Reserva de la Biosfera "Araucarias"

Gabon: Réserve naturelle intégrale d'Ipassa-Makokou

Ghana: Bia National Park

Ivory Coast: Parc national de la Comoé

Panama: Darien National Park

Rwanda: Parc national des Volcans

Spain: Reserva de la Biosfera del Canal y los Tiles; Reserva de la Biosfera de las Marismas del Rio Odiel; and Reserva de la Biosfera de las Sierras de Cazorla y Segura

United States: South Atlantic Coastal Plain Biosphere Reserve; Central Gulf Coastal Plain Biosphere Reserve; and California Coast Ranges Biosphere Reserve.

Upon the request of the United States of America, the two biosphere reserves in the Hawaiian Islands, Haleakala National Park and Hawaii Volcanoes National Park were combined into one cluster to be known as the Hawaiian Islands Biosphere Reserve.

With the addition of the new biosphere reserves listed above and the combination of the two Hawaiian sites into one cluster, the international biosphere reserve network now consists of a total of 226 reserves located in 62 countries.

WWF/IUCN Audiovisual Program Available

Every year a tropical forest three times the size of Switzerland is destroyed—already half the forest is gone. To summarize this crisis the World Wildlife Fund/International Union for Conservation of Nature International Education Project have produced an audiovisual programme entitled: "A Green Earth or a Dry Desert?". It graphically illustrates the value, as well as the beauty, of the tropical forest and shows the aftermath of human exploitation—the ease with which modern man turns forests into deserts.

A world tropical forest conservation and management programme is needed to protect the future of the forest itself and its irreplaceable storehouse of species for mankind. The dependence of people everywhere on the products of the forest, its climatic influence and the future of many industries, lends still more urgency to this global concern. "A Green Earth or a Dry Desert" is available as an 80 frame filmstrip at £6.27 or as a slidepack at £12.52. Printed scripts are included. A pre-recorded cassette of the narration with music and sound effects helps bring the forest to life and is available at £3.80. (All prices include VAT, postage and packing). The programme can be obtained from—

WWF/IUCN INTERNATIONAL
EDUCATION PROJECT
Greenfield House, Guiting Power
Glos. GL 54 5 TZ, England

Indian Wildlife Authority Changes

Wildlife conservation authority in India has been transferred from the Department of Agriculture to the Department of Environment, and a programme has been drawn up to form the basis for a national wildlife policy.

India Prime Minister Indira Gandhi announced this change at the meeting of the Indian Board for Wildlife in October, 1982. She outlined the 12 point programme, which included: Establishment of a network of protected areas such as national parks, sanctuaries, biosphere reserves to cover representative samples of all major wildlife ecosystems and with adequate geographic distribution; restoration of degraded habitats to their natural state within the protected areas; and rehabilitation of endangered and threatened species and their restoration to protected portions of their former habitat in a manner which provided some reflection of their original distribution.

The plan also envisaged development of appropriate management systems for protected areas including a professional cadre fully trained in all aspects of wildlife.

Mrs. Gandhi released a special multicoloured postal stamp depicting a Kashmir Stag (hangul) and a first-day cover to mark the national Wildlife Week, celebrated in the first week of October every year.

The Board also decided to set up a task force to identify viable wolf habitat to protect the fast dwindling Indian wolf.

(From Newsletter, World Wildlife Fund—India, Vol. 3, No. 4)

Letters

From David M. Graber, Research Scientist, Sequoia and Kings Canyon National Parks, California.

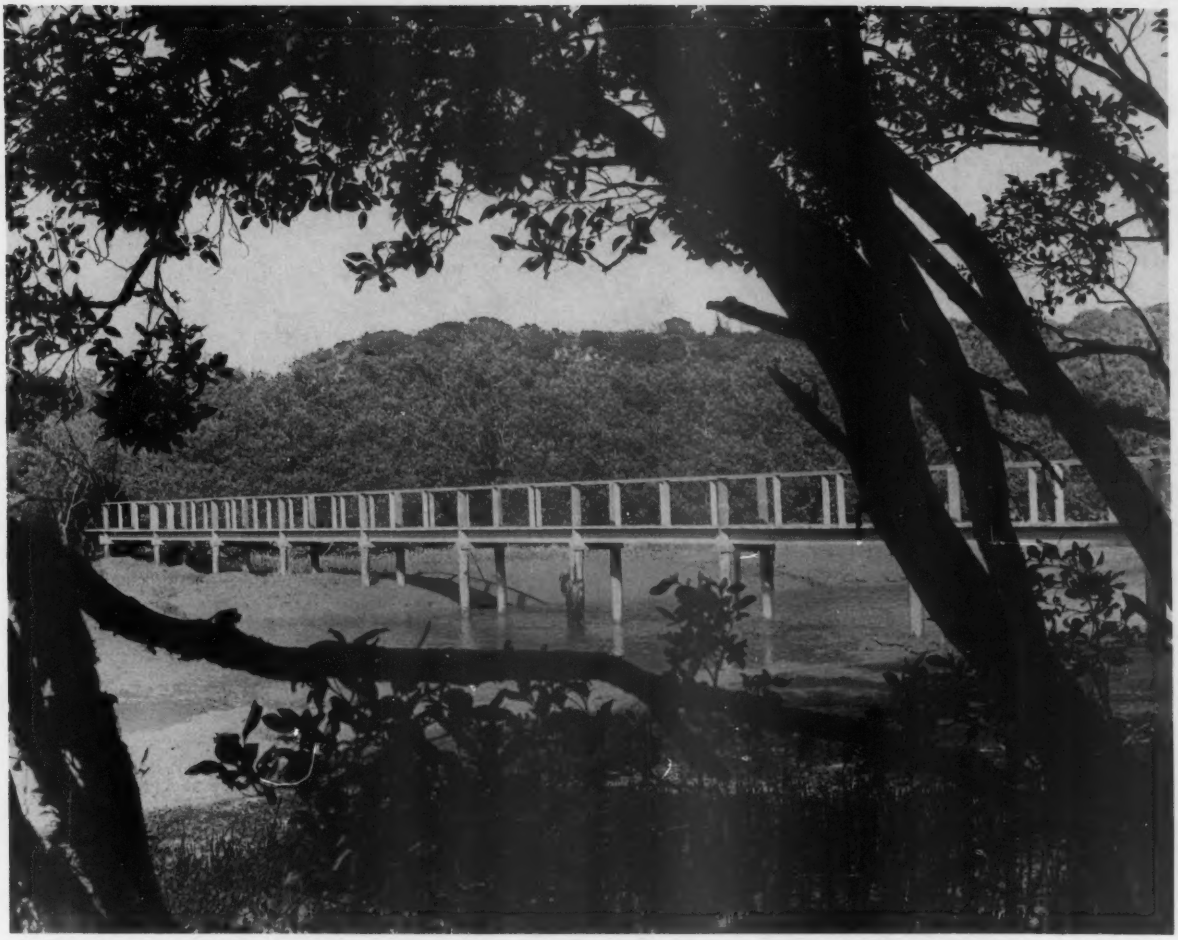
Dear Editor:

The recent Vol. 7, No. 4 issues of PARKS contains an article by Roger D. Applegate entitled "Ways to Prevent Confrontations Between Backpackers and Bears." The article contains some misinformation and some questionable statements with, I believe, a capacity for mischief.

Firstly, the drawing of suspended food does not depict adequate protection from black bears insofar as the Sierra Nevada of California, and undoubtedly other areas, is concerned. Black bears in the West can easily reach food suspended only 1.2 m from a vertical, climable structure; we recommend 3 meters. Secondly, rope tie-offs on the trunk of the tree can be bitten through or torn by a bear climbing the tree, or reaching up from the ground. The preferred — although not foolproof — procedure is to counterbalance food on a live horizontal limb, a difficult procedure for campers, . . . but also difficult retrieval for bears. Lastly, your photographs show food in plastic bags. It has been my experience that tenacious bears, unable to reach food or tear rope, sometimes shake the rope repeatedly until bags tear open from the stress. As a result, we recommend suspending food in nylon stuff sacks.

Although my personal research experience has been with black bears, not grizzlies, I am quite familiar with the literature on grizzly/human interactions. Based on that data, I question the recommendations: "It is better to stay out of grizzly areas during the menstruation period;" and "Refrain from sexual activity when in grizzly country." Correlations between sex or menstruation and attacks by grizzly bears are based on only a few anecdotal incidents, utterly without statistical backing. A casual mention that there might be a link is probably justified, but a definitive statement has a nuisance value greater than the safety it provides.

My criticism of Applegate's article aside, I thoroughly enjoy PARKS. It provides a valuable service to field personnel through examples from other places and a sense of belonging to an international parks community.



Hutia Creek bridge, part of a 284-meter wooden walkway, traverses a mature black mangrove (Avicennia marine) *forest in a Waitangi National Trust area, North Aukland, New Zealand. This mangrove ecosystem acts as a buffer between land and sea, and is a rich nursery habitat for fish, crustaceans and mollusks. Photo: Waitangi National Trust*

Back Cover: Once a sterile, uninteresting masonry pool in the heart of Washington, DC., Bolivar Pond is now an oasis of green amidst busy streets and large office buildings. Visitors rest in the shade of surrounding trees, watching the waterfowl, fish, turtles and other aquatic wildlife that have been attracted to the living waters. Photo: John Hoke

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